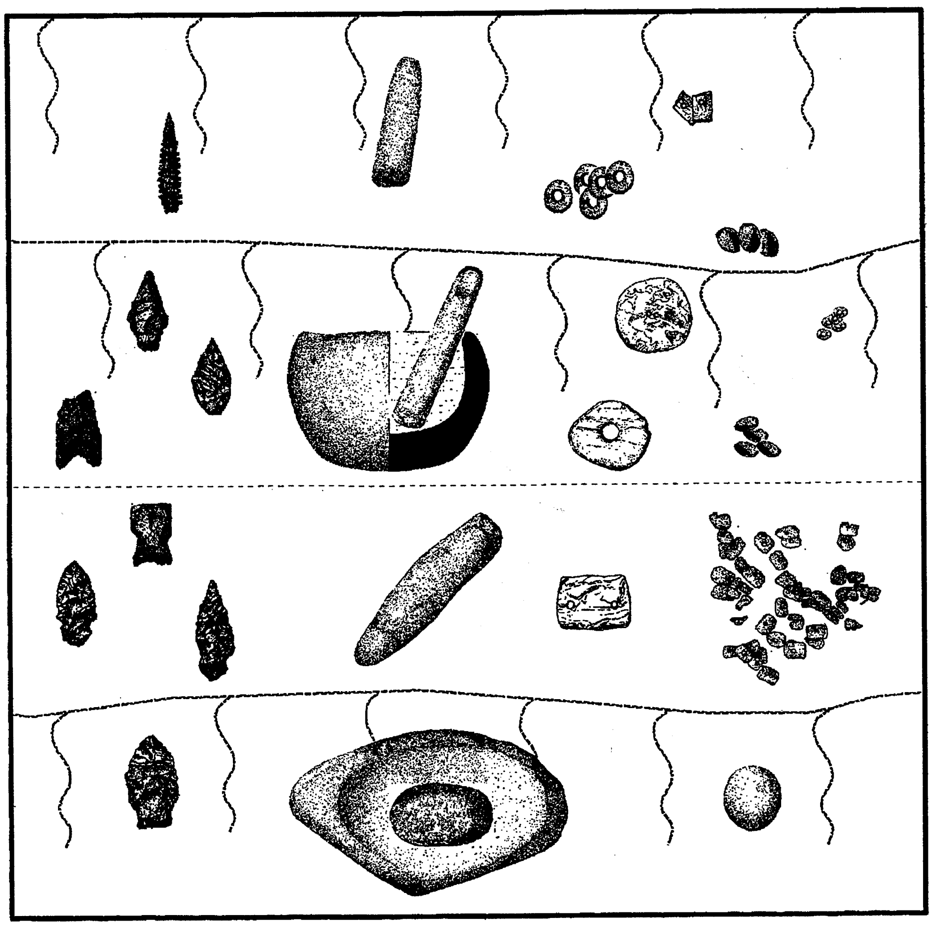
Archaeological and Geoarchaeological Investigations at Eight Prehistoric Sites in the Los Vaqueros Reservoir Area, Contra Costa County, California



prepared by

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ARCHAEOLOGICAL AND GEOARCHAEOLOGICAL INVESTIGATIONS AT EIGHT PREHISTORIC SITES IN THE LOS VAQUEROS RESERVOIR AREA, CONTRA COSTA COUNTY, CALIFORNIA

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ABSTRACT

As part of the Los Vaqueros Project, the Anthropological Studies Center (ASC) undertook a phased treatment program between August 1994 and May 1996 to mitigate proposed impacts to archaeological resources at one potential site (S-20), eight recorded prehistoric sites (CA-CCO-447/H, -458/H, -459, -468, -469, -621/H, -636, and -637), and one newly discovered prehistoric site (CA-CCO-696). In addition, emergency archaeological salvage was conducted near CA-CCO-631 to recover redeposited human remains discovered in the project area. The Los Vaqueros Project is being conducted by the Contra Costa Water District (CCWD) in southeastern Contra Costa County and northeastern Alameda County. Once completed, the project will consist of a dam and storage reservoir, which will inundate part of the upper Kellogg Creek valley, and water-intake and conveyance systems. The cultural resources studies have been conducted in compliance with Section 106 of the National Historic Preservation Act, under authority of an interagency Programmatic Agreement, with the Bureau of Reclamation as lead federal agency.

In an effort to locate and mitigate resources in advance of activities by construction contractors, CCWD funded a subsurface archaeological survey program that evaluated the potential for buried archaeological deposits in the project area. Radiocarbon dates were obtained from 36 natural contexts to establish the depositional sequence of the landform-sediment assemblages in the area. Five major chronostratigraphic units, each separated by an unconformity, were identified and dated as follows: Pleistocene (late Pleistocene); Rincon (early to middle Holocene), Kellogg (early Holocene), Vaqueros (middle Holocene), and Brentwood (late Holocene). Buried archaeological materials, including a previously unknown buried archaeological site (CA-CCO-696), were found to be associated with well-developed soils (paleosols) formed in the Kellogg and Vaqueros deposits. The findings of the subsurface survey indicated that large-scale geological processes had buried land surfaces that were once occupied by prehistoric people in the project area. All excavation and other field work was completed before construction began, thus avoiding any project delays.

Level 1 investigations were implemented at CA-CCO-447/H, -468, -469, -621/H, -636, and S-20. No prehistoric archaeological remains were identified by investigations at S-20 and CCO-621/H. At CCO-447/H, a single rock feature was identified near the surface, but the more deeply buried archaeological materials at the site were found to be redeposited. Despite the presence of several bedrock mortar (BRM) cups at the surface of CCO-469, subsurface archaeological deposits at the site were almost nonexistent. At CCO-468, a sparse deposit of archaeological materials was found at or near the surface of the site, along with a rock feature, block mortars, and several BRM cups. A radiocarbon date, combined with obsidian-hydration readings and temporally diagnostic obsidian projectile points, indicate that human use of CCO-468 dates to the Upper Emergent period. A sparse deposit of archaeological materials, including a side-notched projectile point and a few portable mortars, was found at or near the surface of CCO-636. Subsurface deposits at the site included a single rock feature. A small side-notched arrow point, a radiocarbon date, and obsidian-hydration readings indicate that human use of the site dates to the Upper Archaic and Emergent periods.

Level 2 investigations were implemented at CA-CCO-459, where a discrete deposit of buried archaeological remains was found near an outcrop with several BRM cups at the modern ground surface of the site. The site was also found to contain buried BRM cups, flaked-stone artifacts, and a varied assemblage of floral and faunal remains. The remains of a single human infant were also recovered. Features at the site included a refuse scatter, a possible rock hearth, and two possible cooking pits. While no temporally diagnostic artifacts were recovered, five radiocarbon dates and obsidian-hydration readings indicate that human use of the site dates from the Late Archaic to the early Emergent periods.

Level 3 investigations were implemented at CA-CCO458/H, -637, and -696. At CCO-458/H, a variety of archaeological remains were found to be widely distributed at or near the surface of the site in association with the Brentwood deposit. Two areas of concentrated cultural materials were identified

at the surface of the site and designated as the East and West Locus. Although the East Locus contained a variety of flaked-stone materials, no features or temporally diagnostic artifacts were recovered. In contrast, the West Locus contained a diverse assemblage of archaeological remains, including three human burials, several residential features and groundstone implements, dozens of beads and projectile points, numerous floral and faunal remains, thousands of pieces of flaked-stone toolmaking debris, and countless pieces of heat-altered rock. Obsidian-hydration evidence indicates human use of the East Locus from the Upper Archaic to the Lower Emergent period. A radiocarbon date combined with the obsidian-hydration readings, temporally diagnostic artifacts, and chronostratigraphy indicate primary human use of the West Locus during the Lower and Upper Emergent periods.

The initial phase of investigations at CCO-637 revealed a relatively sparse deposit of archaeological remains associated with a buried paleosol. A projectile point, several *Olivella* beads and groundstone implements, a variety of flaked-stone materials, rock features, floral and faunal remains, and one human burial were recovered during this phase. Additional human remains and artifacts were subsequently identified during construction monitoring at the site. This report incorporates the analysis of the first 18 of 24 individuals so far recovered from the site. Three of these burials, including 1 containing an extensive bead lot, are among the oldest to be radiocarbon-dated in central California. Four radiocarbon dates combined with obsidian-hydration evidence and the temporally diagnostic artifacts indicate primary human use of the site during the Middle Archaic period, with sporadic use extending into the Emergent period.

At CCO-696, an extensive deposit of archaeological remains was found to be associated with a buried paleosol formed in the Vaqueros deposit. The site was originally discovered in a backhoe trench excavated near the dam footprint as part of the subsurface archaeological survey. A diverse assemblage of artifacts was identified at the site, including flaked-stone tools and projectile points, floral and faunal remains, groundstone implements, shell beads and ornaments, residential features, and at least 169 human burials. Additional subsurface testing at the site revealed that deeply buried archaeological remains were associated with a buried soil formed in the Kellogg deposit. The artifact assemblage from this deeper deposit included a wide stem obsidian projectile point, handstones, millingslabs, flaked-stone core tools, and some floral and faunal remains. Two radiocarbon dates of more than 9000 B.P. were obtained from this deposit, indicating that it is the oldest archaeological deposit yet dated in the greater San Francisco Bay region. Four additional human burials and dozens of artifacts were subsequently recovered during construction monitoring at the site. A radiocarbon date of 7400 B.P. was obtained from one of these individuals (Burial 160), the oldest human burial yet dated in the region. Eleven radiocarbon dates combined with obsidian-hydration evidence, temporally diagnostic artifacts, and chronostratigraphy indicate that human use of the site extends from the Lower Archaic through the Emergent period.

These investigations have revealed a surprisingly long and relatively complete record of prehistoric human occupation in the Los Vaqueros Project area. Although previous studies suggested that Los Vaqueros was a marginal area for human use and settlement, these investigations demonstrate that it was occupied by prehistoric people much earlier than estimated, and that it was used as a permanent or semi-permanent residential base more than 2,000 years ago. Significant variations in the artifact assemblages appear to represent important technological adaptations that are considered to reflect attendant changes in human settlement/subsistence patterns throughout the Holocene. These investigations emphasize the importance of understanding the influence of regional landscape evolution on the nature and completeness of the archaeological record in central California.

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Several government agencies are participants in the cultural resources Programmatic Agreement for the Los Vaqueros Project. We would like to acknowledge their representatives, who have reviewed the project's archaeological reports and offered helpful comments: G. James West, Bureau of Reclamation; Patti Jo Johnson, U.S. Army Corps of Engineers; and Donna Sheeders, California State Water Resources Control Board.

The following professionals made a special effort to visit the project area during field investigations: Drs. G. James West, William Olsen, and Pat Welch of the Bureau of Reclamation; Professor Tom Anderson of the Sonoma State University Geology Department; Dr. Mark Basgall of California State University, Sacramento; paleopedoseismologist Dr. Glenn Borchardt of Soil Tectonics; project osteologist Dr. Lori Hager; geoarchaeologist Dr. Michael R. Waters of Texas A&M University; archaeologist Randy Wiberg of Holman & Associates; project archaeobotanist Eric Wohlgemuth of Far Western Anthropological Research Group; and archaeologist Allan Bramlette.

Many individuals played a crucial part in the field investigations. Greg White, then ASC Senior Research Archaeologist, was instrumental in formulating a field-work plan and research strategy that recognized and addressed the archaeological potential of the project area. Steve Clifton, Virginia Getz, and the other biologists of Jones & Stokes provided great assistance in the environmentally sensitive areas. We were able to avoid much backbreaking work through the careful hands of Bruce Harborth, who proved that the backhoe is just a large trowel. Stacey Silva came to the rescue when a second backhoe was needed and did a splendid job. Thanks to Seana Gause, who assisted on the first subsurface survey. Special thanks to all of the members of the field crew (see Chapter 1, Table I.1), who helped us pick, shovel, and trowel our way through hard soil on many a hot day.

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In the early 1980s when the ASC began investigating the prehistory of the Los Vaqueros Project area, Professor David Fredrickson served as Principal Investigator on the first of many cultural resources studies that were to follow. When prehistoric site excavations finally began in 1994, it again was David Fredrickson (Professor Emeritus) who guided the investigations through the many attendant hoops and hurdles. Now, more than 15 years from its beginnings, this study has finally come to fruition due to Dr. Fredrickson's insight, patience, and determined effort. We know that others who have worked with you over the long course of this project join us in saying — Thank you, Dave!

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PART I
INTRODUCTION

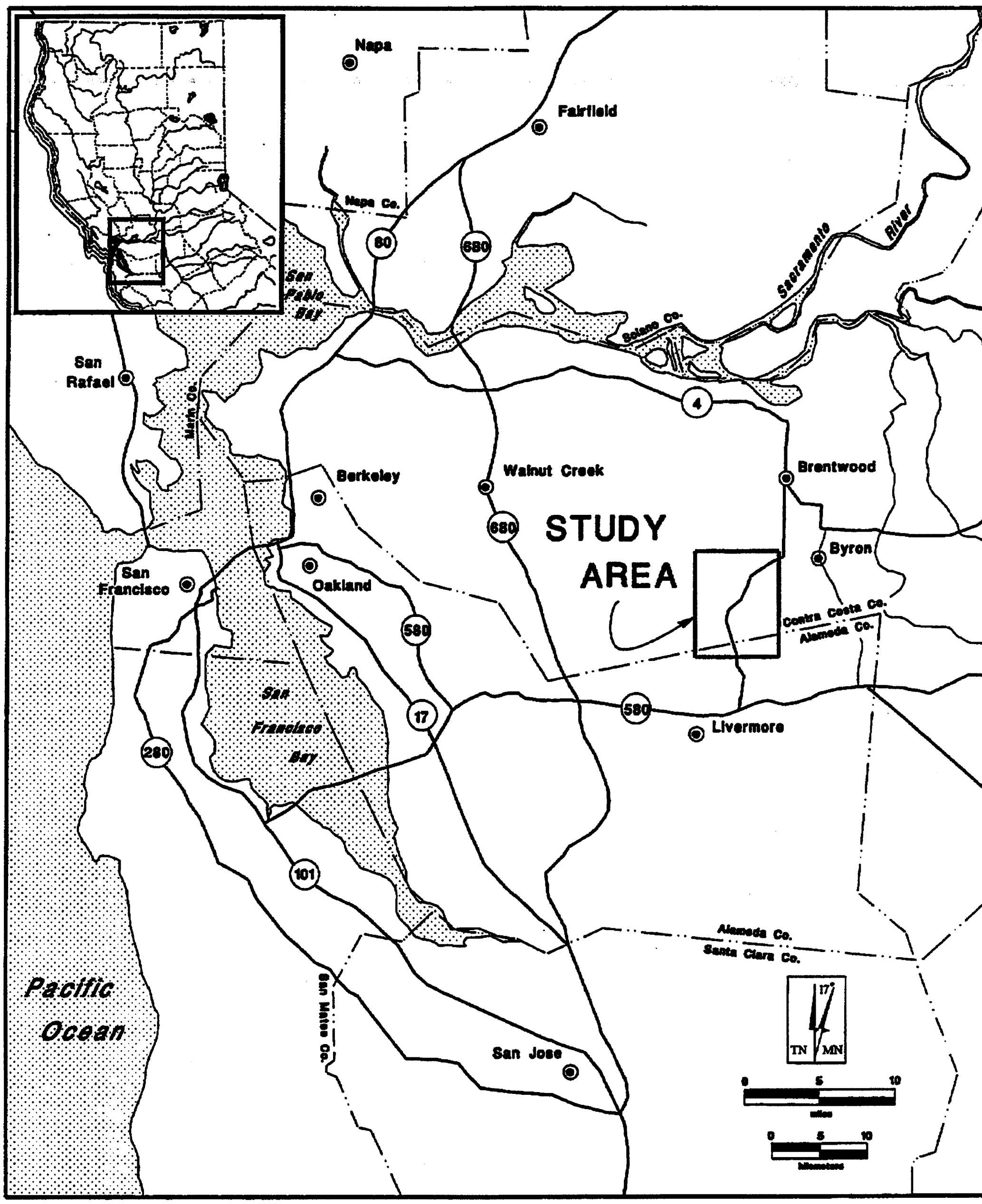

Figure I.1. Los Vaqueros Project Area Location

CHAPTER 1
INTRODUCTORY REMARKS

CULTURAL RESOURCES OF THE LOS VAQUEROS PROJECT

This report presents the methods and findings of the prehistoric archaeological and geoarchaeological studies conducted for the Los Vaqueros Project undertaken by Contra Costa Water District (CCWD) in eastern Contra Costa and Alameda counties, California (Figure I.1). The project consists of construction of a dam and reservoir, water-intake and conveyance systems to divert water from the Sacramento–San Joaquin Delta to the reservoir, recreational facilities, and utility- and road-relocation alignments (Figure I.2). CCWD is acting as the lead state agency for the project, while the U.S. Bureau of Reclamation (Reclamation) is the lead federal agency. The U.S. Army Corps of Engineers (Corps) and the California State Water Resources Control Board (SWRCB) are cooperating federal and state agencies, respectively.

PREVIOUS STUDIES

Identification and Evaluation

Cultural resources studies of the 17,000-acre Los Vaqueros Project area have been conducted in compliance with Section 106 of the National Historic Preservation Act (NHPA), the National Environmental Policy Act (NEPA), and the California Environmental Quality Act (CEQA). Reports detailing the archaeological and architectural surveys, site and building records, summary archaeological inventory report, and the *Evaluation, Request for Determination of Eligibility and Effect* document have been transmitted to the California State Historic Preservation Officer (SHPO) and are on file at the Northwest Information Center, California Historical Resources Information System (Bramlette et al. 1991a, 1991b; Praetzellis and Praetzellis 1992; Sonoma State University Academic Foundation [SSUAF] 1992).

Sixty-two of the 68 prehistoric and historic archaeological properties identified within the Los Vaqueros Project Area of Potential Effects (APE) are considered individually eligible to the National Register of Historic Places (NRHP) or are defined as contributing elements to the NRHP district (SSUAF 1992). The architectural component of the Starr Ranch was evaluated as individually eligible under NRHP Criteria C and D. (Figure I.3 shows all prehistoric sites/components identified in the Los Vaqueros Project area.)

Programmatic Agreement and HPTPs

Pursuant to Section 800.13 of the regulations (36 CFR 800) implementing Section 106 of the NHPA, Reclamation, CCWD, Corps, SWRCB, SHPO, and the Advisory Council on Historic Preservation entered into a Programmatic Agreement (PA) stipulating Reclamation's Section 106 responsibilities. As some cultural resources will not be potentially affected for many years, a phased treatment program is being implemented to facilitate project development while avoiding or minimizing effects on historic properties within the Project APE.

The treatment program is guided by Historic Property Treatment Plans (HPTPs), three of which have been developed to date. The first HPTP (SSUAF 1993) detailed the treatment for 10 contributing or eligible archaeological sites within the Vasco Road Relocation and Water Conveyance System APEs; reports on these studies are now available (Praetzellis et al. 1995; Stewart and Villemaire 1995). The HPTP also specified historical and ethnographic research targeted to alleviate data gaps identified during the evaluation process and subsequent studies. Results of these studies are presented in the Native American history (SSUAF 1994a;) and the working-history volume (Praetzellis, Stewart, and Ziesing 1997). The second HPTP (SSUAF 1994b) focused on treatment of 10 prehistoric and historic

archaeological sites that would be impacted by the construction of the reservoir and dam within the Los Vaqueros watershed. The archaeological studies are reported in Ziesing (1996, 1997) and the present volume. The HPTP also identified architectural work at Starr Ranch (Upton and Solari 1996). Further studies to be conducted for the Native American history of the project area resulted in an ethnographic study of the Ione Miwok (Lobo 1995) and a synthesis of major ethnographic and ethnohistorical research (Fredrickson, Stewart, and Ziesing, eds. 1997); a study of the rock art of nearby Vasco Caves (Fentress 1996), which would be potentially affected by the relocation of Vasco Road, was also conducted under the second HPTP. Interpretive volumes have also been produced for the public (Praetzellis, Ziesing, and Praetzellis 1997; Ziesing, ed. 1997). The third HPTP (SSUAF 1995) deals with the treatment of Late Discoveries encountered during construction.

Seven of the eight prehistoric archaeological sites that are the focus of this volume were identified in the HPTPs (CA-CCO-458/H, -459, -468, -469, -631, -636, and -637); three other locations recommended for study by the HPTP were found not to contain prehistoric archaeological deposits (Auger Station S-20; CCO-447/H; and CCO-621), while one location consisted of redeposited site soils containing human remains (CCO-631). Because construction of the dam and conveyance facilities would involve a considerable amount of earth disturbance, CCWD authorized a subsurface survey program for areas deemed to be archaeologically sensitive. This work, which resulted in the discovery of two deeply buried archaeological deposits that constitute the eighth archaeological site (CA-CCO-696), was reported on by Meyer (1996) and is discussed in Chapter 4.

THE PREHISTORIC ARCHAEOLOGICAL PROJECT

The archaeological field investigations described in this report occurred between August 1994 and May 1996, with laboratory processing and cataloging and the analysis of findings continuing into 1997. Field work involved the examination of hundreds of cubic meters of archaeological site matrix, exposure of dozens of cultural features, and the removal of nearly 200 human burials. Construction monitoring, which has resulted in the discovery of buried site deposits and additional human remains, continues as of June 1997. (Summary volumetric data for the sites are presented in Appendix A.) Nonfield studies have involved osteological, archaeobotanical, and faunal analyses; obsidian sourcing and hydration analyses; radiocarbon age determinations for 71 samples from natural and cultural contexts; and floral and rock identifications.

Cultural materials associated with burials were cataloged, analyzed, and prepared for reburial with the human remains. The permanent artifact collection, complete artifact catalog, field notes and records, photographs, and other documentation of the Los Vaqueros Project prehistoric investigations are curated at the Archaeological Collections Facility, Anthropological Studies Center, Sonoma State University, Rohnert Park, California. (Each site was assigned a separate accession number by the Collections Facility; see page II.43.) Copies of relevant reports and documents will also be placed on file with the Northwest Information Center of the California Historical Resources Information System at Sonoma State University.

PROJECT PERSONNEL

Numerous Anthropological Studies Center personnel and consultants contributed to the field, laboratory, analysis, and report-production stages of this project. Table I.1 provides the names of people involved in the project and summarizes their qualifications and duties.

REPORT ORGANIZATION

This report of the archaeological studies outlined above is organized into five parts:

Part I includes, in addition to these Introductory Remarks, a description of the environmental and cultural settings of the project area along with references to additional studies on these topics.

Part II, entitled Research Goals and Methods, provides background on the geoarchaeological approach that has guided the identification efforts for the Los Vaqueros Project and influenced analysis and interpretation. Also outlined are basic regional research issues to which Los Vaqueros sites can contribute. Because the particular methods used in the field are a direct outgrowth of theoretical orientation and research concerns, the methods are detailed in this part as well: first, the methods and results of the Subsurface Survey, followed by the excavation and other recovery methods used at the investigated sites.

Part III describes the archaeological sites and presents brief summaries of the results of their study. Each site report includes descriptions of the site setting, site stratigraphy and formation, chronometric data, cultural features, a summary of burials, where relevant (detailed burial descriptions are in Appendix D), and a brief summary of the site's artifact assemblage(s).

Part IV includes discussions of the investigations' findings on a project-wide basis, including information on all artifact categories encountered, the results of special studies including chronometrics, and a summary of the osteological analysis and the mortuary patterns represented.

Part V presents a synthesis of the results, which are viewed in terms of the basic research issues identified for the Los Vaqueros Project: Chronology, Settlement and Subsistence, Interaction and Exchange, and Landscape Evolution. Finally, directions for future research within the project area and elsewhere in the interior Diablo range are identified.

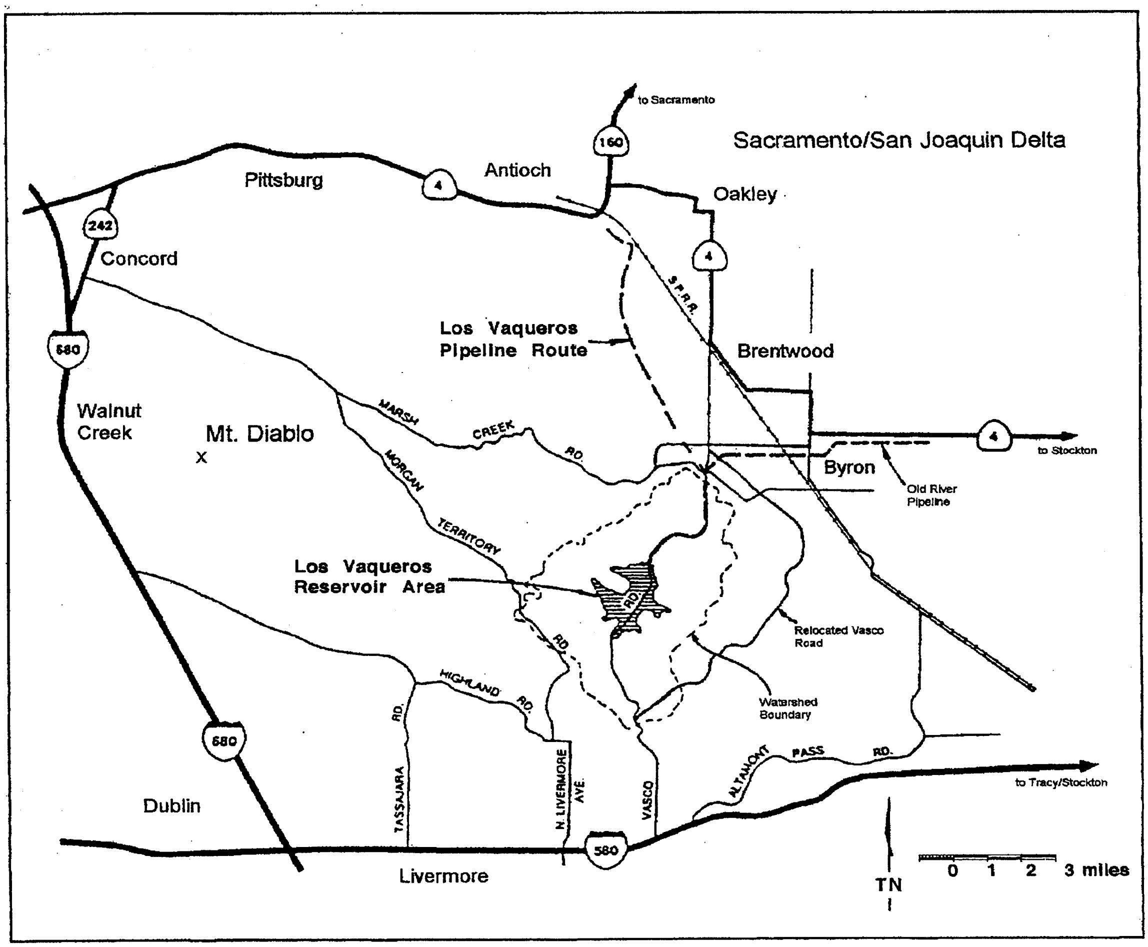

Figure I.2. Los Vaqueros Project Area Vicinity

TABLE I.1
PROJECT PERSONNEL

Name	*Title*	*Qualifications*	*Responsibilities*
Bradley Adams	Field Technician	B.A., Anthropology	field work
Karen Blum	Field Technician	B.A., Social Science	field work
Darrell Cardiff	Field Technician	B.A., Social Science	field work
Alex DiGeorgey	Field and Lab Technician	B.A., Anthropology	field work, soil sample analysis
John L. Edwards	Field Technician	B.A., Anthropology	field work
Kimberly Esser	Computer Specialist	B.A., Anthropology CRM graduate student	GIS analysis, report graphics
David A. Fredrickson	Co-Principal Investigator (Prehistoric Archaeology)	Ph.D., Anthropology; SOPA	administration, field work
Denise M. Furlong	Field Technician	B.A., Liberal Arts	field work
Robert H. Gargett	Field Technician	Ph.D., Anthropology	field work
Sue Gray	Graphics Specialist	B.A., Anthropology CRM graduate student	report graphics and layout
Judith Gregg	Osteology Technician	Anthropology undergraduate student	osteological analysis, flotation processing
Lori D. Hager	Human Osteologist	Ph.D., Anthropology	osteological analysis
Bruce Harborth	Backhoe Operator	CA. Bonded	field work, backhoe operation
Virgina R. Hellmann	Field Technician	B.A., History CRM graduate student	field work
Cassandra Hensher	Field and Lab Technician	B.A., Spanish	field work, catalog compilation
Julia E. Huddleson	Lab Supervisor	B.A., Anthropology, M.A., Education; CRM graduate student	field work, catalog compilation, shellfish analysis, report contribution
Todd Jaffke	Field Technician	B.A., Anthropology CRM graduate student	field work
Thomas Kingsbury	Field Technician	B.A., Anthropology	field work
Jonathan L. Legare	Osteology Technician	Anthropology undergraduate student	flotation processing, osteological analysis
Cris Lowgren	Field and Lab Technician	B.A., Anthropology CRM graduate student	field work, catalog compilation, artifact analysis
David Makar	Lab Technician	Anthropology undergraduate student	flotation processing
J. Patrick McClary	Field Technician	B.G.S., Anthropology	field work
Jack A. Meyer	Project Coordinator/ Geoarchaeologist	M.A., Cultural Resources Management (CRM)	field-work direction, geoarchaeological analysis, report writing, graphics, and compilation

Bryan K. Mischke	Field Technician	B.A., Anthropology	field work
Steven J. Moore	Field and Lab Technician	B.A., Anthropology CRM graduate student	field work, catalog compilation
James Nelson	Field Technician	B.A., Anthropology	field work
Maximillian A. Neri	Field Technician	B.A., Anthropology	field work
Thomas M. Origer	Hydration Lab Director	M.A., Anthropology	obsidian-hydration analysis
Conrad Praetzel	Field Technician	A.A.	field work
Adrian Praetzellis	Co-Principal Investigator (Historical Archaeology)	Ph.D., Anthropology; SOPA	administration
Mary Praetzellis	Co-Principal Investigator	M.A., CRM; SOPA (historical archaeology)	project management
James P. Quinn	Zooarchaeologist	B.A., Anthropology	faunal analysis (fish)
Jeffery S. Rosenthal	Prehistoric Archaeologist/ Field Director	M.A., CRM	field-work direction, archaeological analysis, report writing, graphics, and compilation
Margo Schur	Field Technician	B.A., Art History	field work
Suzanne Stewart	Editor	M.A., CRM; SOPA	editing, compilation, and report contribution
William L. Stillman	Flotation Specialist	B.A., Anthropology Graduate student: CSUS Sacramento	flotation direction and processing
Michael Stoyka III	Field Technician	A.A.	field work
Krislyn K. Taite	Zooarchaeologist	B.A., Anthropology	faunal analysis, report contribution
Michael R. Waters	Geoarchaeologist	Ph.D., Geoarchaeology	geoarchaeological consulting
Solomon Warhaftig	Field Technician	B.A., Anthropology	field work
Scott Warnasch	Field Technician/Artist	B.A., Anthropology	field work, report graphics
Rosemary F. White	Graphics Specialist	B.A., Psychology	CAD, report graphics and consulting
Gregory G. White	Senior Research Archaeologist	M.A., Anthropology UCD Ph.D. Cand.	field-work planning and research strategy
Eric Wohlgemuth	Archaeobotanist	M.A., Anthropology UCD Ph.D. program	flotation supervision, archaeobotanical analysis, report contribution
A. Richard Wolter	Field Technician	B.A., Anthropology	field work

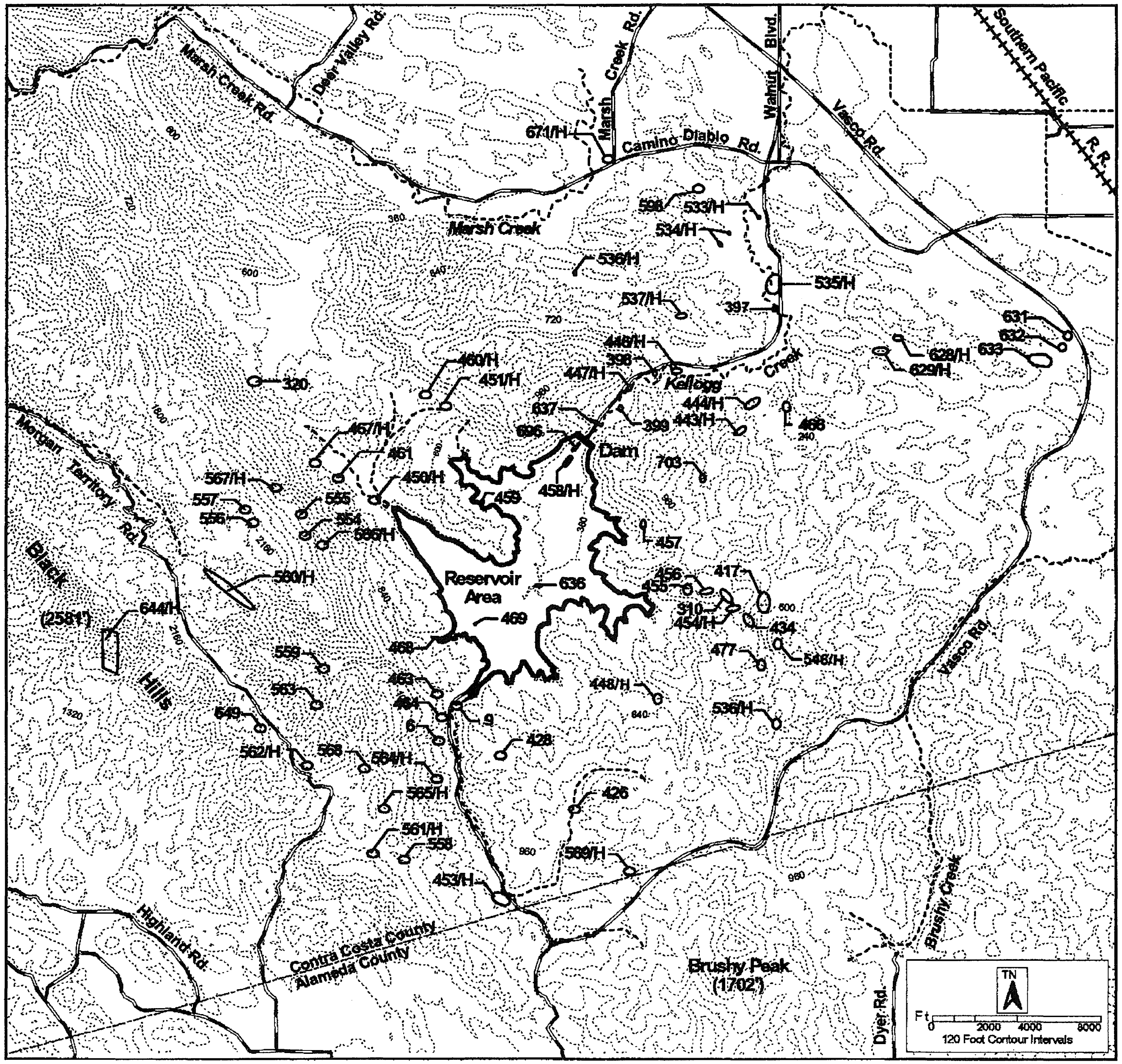

Figure I.3. Prehistoric Archaeological Sites and Components in the Los Vaqueros Project Area

CHAPTER 2
LOS VAQUEROS PROJECT SETTING

ENVIRONMENTAL SETTING

The environmental descriptions provided below are intended as a summary introduction. As the archaeological landscape of the project area is a primary concern of the geoarchaeological approach to these investigations, considerable detail on topography, geology and soils, and landscape evolution can be found in Part II of this report.

LOCATION

The Los Vaqueros Project is located within southeastern Contra Costa County and a small portion of northeastern Alameda County, approximately 64 kilometers (40 miles) east of San Francisco, 24 km (15 mi.) south of Antioch, and 40 km (25 mi.) west of Stockton. The most dominant landform in the region is Mt. Diablo, whose summit is about 16 km (10 mi.) to the northwest, while the edge of the vast Sacramento–San Joaquin Delta system is a few miles to the northeast. The nearest communities are Brentwood 11 km (7 mi.) to the north, Byron 10 km (6 mi.) to the northeast, and Livermore 13 km (8 mi.) to the south (Figures I.1, I.2).

PHYSIOGRAPHY

The Los Vaqueros Reservoir watershed is located in the upper portion of the Kellogg Creek drainage. The terrain is marked by southwest- and northeast-trending valleys, through which flow the waters of perennial Kellogg Creek and its tributaries. The deep canyon near the headwaters in the south opens out to the broad Vasco (or Kellogg Creek) Valley in the center of the watershed, which will be inundated by the Los Vaqueros Reservoir. Several springs are mapped within the watershed; in the first decades of the 19th century, when the area was a part of the Mission San Jose grazing lands, the valley was known as the *Poso de los Vaqueros*, 'Spring of the Cowboys' or 'Cowboy Spring' (Praetzellis, Stewart, and Ziesing 1997:15-17). The hills bordering the valley system range from about 40 to 335 meters (130 to 1,100 feet) above mean sea level in the east and rise to more than 731 m (2,400 ft.) in the Black Hills to the west.

CLIMATE

The climate of the project area is Mediterranean, of the Csa and Csb subtypes (Donley et al. 1979:137), similar to that of the Central Valley. Winters are wet and mild to moderately cold, alternating with hot, dry summers. The average temperature of the coldest month is 3 to 9 degrees C. (37 to 48 degrees F.), while the average temperature of the warmest month is 18 to 24 degrees C. (64 to 75 degrees F.; Simons 1982:34); summer temperatures, however, frequently exceed 100 degrees F. Aridity is pronounced at Los Vaqueros area due to the area's location in the rainshadow of Mt. Diablo; average annual precipitation is 25 to 50 cm (10 to 20 in.), with 90 percent occurring from November through April (Simons 1982:34-35). Characteristic of the hill country in this region are the high winds, which have been harnessed economically by the hundreds of acres of wind farms in the vicinity; the valley of Los Vaqueros was favored by early stockraisers for its protection from the winds, while the rockshelters on the hills to the east served the same purpose for prehistoric and historic-period humans, wild life, and livestock (Praetzellis, Stewart, and Ziesing 1997:13-14).

GEOLOGY AND SOILS

The Los Vaqueros area, lying within the border zone of the Great Valley and Coast Range geomorphic provinces, is characterized by the presence of tremendously thick sediments. Shelf, slope, and land deposits of the Cenozoic and earlier marine sediments of the Mesozoic occur within the project area. Upland slopes are underlain by a series of thinly bedded to massive sandstones dating from the Upper Cretaceous, with interbedded shales, siltstones, and conglomerates (Simons 1982:35). Sandstone outcrops, often of massive size, are found in many portions of the project area. Lowland areas are covered with Holocene alluvium and fan deposits, which the archaeological investigations conducted here have found to be more than 12 m (40 ft.) in depth.

These geologic formations form parent materials for two principal soil associations characterizing the Los Vaqueros area: the Altamont-Diablo-Fontana association, formed on strongly sloping to very steep terrain; and the Brentwood-Rincon-Zamora association, composed of a series of well-drained clay loams and silty clay loams resting on valley fill, alluvial fans, and low terraces.

FLORA AND FAUNA

The Los Vaqueros area is in the contact zone between the foothill woodland and valley grassland plant communities. Most of the eastern portion and much of the central portion are covered by valley grassland. Foothill woodland-savanna typically occurs on hill slopes in the central and western parts, while patches of chaparral are found along the western boundary. Streamside riparian association lines the principal drainages (Simons 1982:35-36). These plant communities have been described by Munz and Keck (1973) and Ornduff (1974). Geoarchaeological and archaeobotanical findings reported in this volume indicate that the project area was a more wooded setting during much of the late Holocene period, while historic archival documents researched for the Los Vaqueros Project indicate that intensive grazing and logging activities occurred during the 1850s and 1860s. Although the project area was once more wooded, the paleobotanical studies reported here indicate that the same suite of species seen today were growing here in the past. Most dominant seeds and nuts in the floral collection are acorn, manazanita, buckeye, wild cucumber, gray pine, and a variety of small seeds.

A diverse fauna inhabits the Los Vaqueros area. Simons (1982:36) notes that the area has been placed in the Central Valley subprovince/district of the Sacramento Freshwater Fish Province (Hopkirk 1973:14-15) and on the boundary between the San Francisco and Great Valley faunal districts/areas (Miller 1951:602, fig.4). More than 217 species of birds are thought to inhabit the project area, the most numerous being California quail. Various species of raptors are frequently sighted and nest within the project area. Today, 65 species of mammals are thought to inhabit the project area, while grizzly bears, tule elk, and pronghorn antelope were present during the early historic period (Simons 1982:37). A discussion of prehistoric and historic-period environmental change in the project area vicinity is provided by Simons (1982:37-48).

CULTURAL SETTING

NATIVE AMERICAN RESIDENTS

The Los Vaqueros Project area is in a location that is poorly understood ethnographically. The archaeological investigations indicate that the Kellogg Creek valley was fairly intensively occupied—if only seasonally—up to about 400 years ago, but it may have been more sporadically used over the last two centuries before European contact. In the mid-1770s, when the Spanish mission system was launched in California, native people from the East Bay began moving to Mission San Francisco (Dolores) and, later, to Mission San José; those who had occupied the Los Vaqueros area moved to these missions between 1803 and 1806 (Milliken 1997c:102-105). Thus the project area was virtually abandoned a century before the first systematic ethnographic work occurred in California. While lines drawn on various maps attribute some or all of the project area to either a Bay Miwok- or

Costanoan/Ohlone-speaking group, no descriptions of the Los Vaqueros area or its aboriginal inhabitants have been found in Spanish- and Mexican-period historic accounts, and no individuals are known who can trace descent back to the project area through a particular person.

In an attempt to explore all reasonably accessible information, the ethnohistoric component of the Los Vaqueros Project undertook a program of ethnohistory, linguistic research, analysis of mission registers and other documents, as well as research into sacred geography and ethnographic interviews with Costanoan/Ohlone people in the East Bay. Reports of these studies were distributed in 1994 (SSUAF 1994). Additional studies authorized included further linguistic research; additional mission-register research; ethnographic interview with Miwok people in the Sierra foothills who recognize historic links with the project area; further sacred geography investigations; and updating of the Native American histories. A report—available at local, regional, and national archives—was prepared on the rock-art recording and comparative pictograph studies conducted for the Los Vaqueros Project at the adjacent Vasco Caves (Fentress 1996).

A synthesis of all Native American history studies (Fredrickson, Stewart, and Ziesing 1997) provides a good background for the late-period Native American use of the project area; the report has been well-distributed among libraries and other archives, schools, research institutions, and native groups. In this work, Dr. Randall Milliken details the various arguments for placement of tribelet boundaries within the project area based on his mission-register and other historic research, concluding that a precise boundary cannot be identified.

> In summary, the Kellogg Creek drainage was near the boundary of two neighboring political groups, the Volvons [Bay Miwok] and the Ssaoams [Costanoan], at the time of the Spanish settlement in California. The Volvons when all is said and done, seem to have held the peak of Mount Diablo and the rugged lands to the east of the peak. Their villages were along the Marsh Creek drainage, perhaps also at Clayton on the north side of Mount Diablo, or in the other direction in the Kellogg Creek drainage. The Ssaoams lived in the dry hills and tiny valleys around Brushy Peak and Altamont Pass, hill lands that separated the Livermore Valley from the San Joaquin Valley. They almost certainly held the high lands south and east of Kellogg Creek, including the Vasco Caves. The Ssaoams may also have held the valley of Kellogg Creek itself [Milliken 1997a:30-31].

PRECONTACT LAND USE

While there is no explicit information on the Ssaoams and Volvons or their immediate neighbors, Milliken (1997b) reconstructed the everyday life of the Los Vaqueros Project area's native people by indirect means—through extrapolations of information from better-documented groups elsewhere in west-central California.

The Los Vaqueros watershed, according to Milliken (1997b), was a boundary area between three independent landholding groups of hunting-gathering peoples, or tribelets, each speaking a separate and distinct language, and each including from 150 to 400 people. These groups made their living collecting diverse resources from their local territories—the women concentrating on an astounding variety of seeds, nuts, berries, and bulbs, and the men augmenting the food supply by fishing and hunting for large and small game. A few important resources were obtained from neighbors through an extensive indirect trading network; items included obsidian glass from the upper valley of the Napa River (and occasionally from other North Coast Ranges and eastern Sierra sources), shells from the coast, and ornamental pigments from various locations. Reciprocal relationships with closer neighbors were also maintained, often with the aid of intermarriage and shared ceremonial activities. These allies could be called upon to share resources in times of local stress. As Milliken noted, "One might suggest that their [the Volvons and Ssaoams] ability to prosper as a group depended as much upon their strategic trading position—on a pass between the Livermore Valley and the San Joaquin Valley—as upon their ability to extract resources from their own territory" (1997b:37). Kellogg Creek residents, at least during the late period, would also have been familar with the Vasco Caves, which played a prominent role in creation myths

and sheltered dozens of outstanding pictograph panels over a vast area of sandstone outcrops. Analysis of pictograph style indicates influence over a wide region, again suggesting the importance of the transmission of ideas and people through the region.

In addition to his project-specific ethnographic and ethnogeographic contributions, Milliken's (1995) recent and widely distributed book on East Bay tribal culture provides excellent context for the project area. As a part of the earlier investigations of the Los Vaqueros Project for the Department of Water Resources, Simons (1982:54-66) presented project-specific data on prehistoric human adaptations based on a review of regional ethnographic literature and archaeological settlement-subsistence models.

HISTORIC-PERIOD LAND USE

The Kellogg Creek valley was used as mission grazing lands during the first decades of the 19th century and, following secularization in the early 1830s, became the common grazing land for neighboring landowners and a regular site for rodeo. In the early 1840s, the 17,000-acre Rancho Cañada de los Vaqueros was granted to three Californio brothers-in-law, who used the area only sporadically during their short tenure. Milliken (1997d:143-144) was able to identify only three surviving Ssaoam descendants and two surviving Volvon siblings in the 1840s mission records; he suggests that one or more of these individuals may have been working on the Los Vaqueros rancho at that time. Another suggestion of post-mission Native American settlement is found in a observation made in the 1930s regarding the Suñol Adobe (CA-CCO-450/H), just outside the reservoir area; an informant of Hendry and Bowman (1940:541-542) recalled an "Indian rancheria" located 1,000 feet up the hill; no other information has been found. The statement may refer to Native American workers living near the Suñols in the 1850s, or simply to prehistoric archaeological site remains.

By the late 1850s, settlers and speculators alike began investing in the Los Vaqueros property, ultimately claiming more than 200 percent of the available land. Because litigation regarding the validity of various claims to the land remained in the courts for more than three decades, development was retarded by central California standards. While neighboring valleys subdivided, focusing primarily on specialty agriculture such as fruit production, Los Vaqueros remained under primarily single ownership until the mid-1900s. The huge property was given over to grain farming and livestock raising, operated by up to a dozen tenant farmers on parcels of around 300 acres each.

This historic-period land use resulted in relatively minimal impacts to sites within the Kellogg Creek valley, while the watershed's uplands have suffered damage from erosion. Although some local agricultural activities damaged or destroyed portions of sites, the low-lying lands in the Los Vaqueros Project area have preserved much of the material evidence of the past settlement system.

PART II

RESEARCH GOALS AND METHODS

CHAPTER 3
RESEARCH GOALS

ANALYTICAL AND INTERPRETIVE FRAMEWORK

INTRODUCTION

Most of what is known about the archaeological record of central California is based on studies of archaeological sites found at or near the present land surface. As a result, there are inherent biases in human settlement-subsistence models due to the greater representation of younger sites at the surface and the lesser representation of older sites, which tend to be more deeply buried. In carrying out the Los Vaqueros prehistoric archaeological project, there was an opportunity to utilize a different approach because some of the impacts of project construction were to occur both extensively and at considerable depth, a function of dam construction. To provide context for the approach taken, this section examines the influence of large-scale geological processes on the record of prehistoric human occupation in central California. More specifically, it focuses on the nature of the archaeological record in the Los Vaqueros area as viewed from the perspective of regional landscape evolution. This view requires examining several important theoretical and methodological issues related to the identification and interpretation of buried sites, which promotes a fundamental re-evaluation of existing prehistoric settlement patterns and models of demographic change in the region.

The discussion below considers (1) the theoretical concepts and methodological applications of a geoarchaeological approach; (2) the ways in which local and regional archaeological site-distribution patterns contribute to models of human settlement and demographic change; (3) the effects of large-scale geological processes on the configuration of the landscape and the distribution of archaeological sites; and (4) possible relationships between the archaeological record and landscape evolution in the Los Vaqueros Project area.

THEORETICAL CONCEPTS

Certain theoretical principles form the basis of the analytical and interpretive framework used in this study. In turn, these principles have had direct implications for the methodological approach. The application of this approach demands that important relationships between method and theory be identified and integrated during all phases of the investigation—from the formulation of field methods, to the development of interpretive conclusions. The following discussion makes explicit linkages between relevant theoretical concepts and their methodological application.

Geological and archaeological studies are unified by the principles of uniformitarianism and stratigraphic succession. *Uniformitarianism* is the view that processes operating at the present have operated the same way in the past to produce similar results, even though the processes may not have operated at the same rate or intensity. The uniformitarian principle is a central part of geoarchaeological reasoning, providing a basis for understanding the nature of past processes. The *principle of superposition* is derived from the observed stratigraphy of geologic deposits, in which the upper are considered to be younger than the lower, unless some type of inversion can be demonstrated. For geoarchaeology, the study of stratigraphy is fundamental for establishing the spatial and temporal relationships between soils and sediments (Waters 1992).

In addition to the uniformitarian and superposition principles, certain ideas developed in the fields of geography, geomorphology, and pedology are often applied in geoarchaeological studies. The result is the formulation of a landscape approach to archaeology that incorporates many aspects of human ecology, landscape evolution, and soil formation. A *landscape approach* is defined as "the archaeological investigation of past land use by means of a landscape perspective, combined with the conscious incorporation of regional geomorphology, actualistic studies (taphonomy, formation processes,

ethnoarchaeology) and marked by ongoing reevaluation and innovation of concepts, methods, and theory" (Rossignol 1992:4). Landforms and geological processes are themselves significant factors in determining the structure and function of natural and cultural systems, in that the distribution, organization, and interrelationships of these systems serve to control the flow of materials and energy across the landscape (Stafford 1995:76). The methods and application of a landscape approach are linked to general theory by uniformitarian assumptions and specific questions regarding observed changes in human land use and social organization in the past. The ultimate goal of a landscape approach is to understand human social and economic change within the framework of an inclusive environmental and evolutionary context (Rossignol 1992:14).

The landscape as a whole consists of variety of soils, sediments, and landforms, created under different conditions at different times. The physical surface on which people interacted with their environment is known as a *geomorphic landscape* (Waters 1992:88). Archaeological deposits associated with geomorphic landscapes are subject to the same processes that affect the distribution, preservation, and visibility of noncultural deposits (Bettis 1992:119). Consequently, the preservation, destruction, and/or redeposition of archaeological materials are primarily controlled by the natural evolution of geomorphic landscapes through time (Kuehn 1993; Waters 1992).

APPLIED CONCEPTS

Geoarchaeological studies require an understanding of geologic, pedologic, and geomorphic processes that affect human occupation and the formation of archaeological sites (Butzer 1982; Davidson and Shackley 1976; Holliday 1992; Rossignol and Wandsnider 1992; Stein and Farrand 1985; and Waters 1992). Foremost among these are processes of stratification, soil formation, and landscape evolution, which together provide a framework for evaluating interactions between people and the landscape.

There is a fundamentally important distinction between soil and sediment. *Sediment* is composed of particles that have been deposited by geological processes, while *soil* is formed through the in-place alteration of rock and sediment. The process of soil formation involves the addition, transformation, transfer, and removal of materials and chemicals in the soil, as determined by the factors of climate, organisms, relief, parent material, and time (Holliday 1990). The combined effect of these factors at or near the surface results in the formation of subsurface horizons that become more distinct or well-developed with time. Weakly developed soils have little or no horizon development and tend to be associated with young and/or unstable landforms. Well-developed soils have distinct horizons and tend to be associated with older, more stable landscapes. When erosion removes the surface of a landform, the process of soil formation begins again on the new surface. In the case where the surface of a landform is buried by a thick deposit of sediment, soil formation stops on the buried land surface, and resumes on the newly deposited surface.

A soil that formed on a landscape in the past but is not actively forming at the present is known as a *paleosol* (Retallack 1988; Waters 1992; Yaalon 1971). Paleosols may form over hundreds or thousand of years, depending on the amount of time that a landform remains stable. The recognition of paleosols is crucial for geoarchaeological studies because they represent relatively stable land surfaces that were potentially available for human occupation. Once buried by sediment, paleosols mark stratigraphic unconformities with overlying deposits, and often retain many of the characteristics that they originally acquired while being exposed at or near the surface (Birkeland, Machette, and Haller 1991). Paleosols can also have extensive lateral continuity that makes them useful as stratigraphic markers (Holliday 1990).

The systemic contexts of archaeological materials are often disturbed by natural soil-formation processes near the surface of stable landforms (Bocek 1986, 1992; Erlandson and Rockwell 1987; Waters 1992; Wood and Johnson 1978). The amount of disturbance is expected to be proportional to the duration of the soil- forming processe. These processes may cause individual artifacts to become disassociated from their original context within surface and buried soils alike. As a result, archaeological features (i.e.,

discrete concentrations of cultural materials) may be thought to retain more of their systemic and stratigraphic integrity than isolated artifacts from the same matrix or arbitrary excavation level. More detailed discussions of the archaeological significance and interpretation of soils, sediments, and paleosols in archaeology can be found in Birkeland (1984), Holliday (1990, 1993), Ferring (1992), and Waters (1992).

ARCHAEOLOGICAL RECORD

The San Francisco Bay–Delta region has been the subject of archaeological study for close to a century. The integrated taxonomy and chronology developed in this region form the core of central California archaeology (Beardsley 1954; Bennyhoff and Fredrickson 1994; Bennyhoff and Hughes 1987; Fredrickson 1973, 1974; Gerow with Force 1968; Lillard, Heizer, and Fenenga 1939). Much of the substantive research, however, has focused on the bayshore and Delta regions proper, leaving the interior portions of the northern Diablo Ranges largely unexamined. Important exceptions are studies by Fredrickson (1966, 1968) in the San Ramon Valley, Banks, Orlins, and McCarthy (1984) in the Walnut Creek Valley, and Wiberg (1988, 1996) in the Livermore Valley. While most of what is known about the prehistory of interior Contra Costa and Alameda counties comes from excavations conducted in these major valleys, relatively few archaeological excavations have been conducted in the uplands and smaller valleys.

Numerous cultural resources management surveys, studies, and inventories have been conducted during various phases of the Los Vaqueros Project. The results of the major studies are summarized by Bramlette et al. (1991a) and will not be reviewed here. At least 20,000 acres in and around the Kellogg Creek drainage have been systematically surveyed for archaeological resources. Several alternative water-conveyance routes were surveyed and/or studied by one or more of the following investigations: Bramlette, Praetzellis, and Praetzellis (1988); Bramlette et al. (1991b); Eidsness (1986); Fredrickson, ed. (1982); Jensen & Associates (1986); and Meyer (1996a). Despite many surface surveys, very few prehistoric sites were identified along the watercourses in the valleys of the study area, where higher site densities had been expected (Bramlette et al. 1991b:14).

The low number of sites in the valleys was even more striking when compared to the number of sites identified on the hillslopes. Of the 24 prehistoric sites recorded in the Los Vaqueros study area, 20 (83%) were found at hillslope locations. Of the 4 prehistoric sites (CA-CCO-447/H, -458/H, -636, and -637) identified in the valleys, one (CCO-458/H) appeared to have been occupied during the Upper Emergent period, or post 900 years before present (B.P.) (Fredrickson, ed. 1982:130).

Previous settlement models posited that human land use in the Los Vaqueros area began 3000 to 3500 B.P., with the most intensive use occurring after 1500 B.P. (Bramlette 1989; Bramlette, Praetzellis, and Praetzellis 1988; Fredrickson, ed. 1982). It was argued that the Los Vaqueros study area was a marginal environment that only received residential occupation after population pressures in adjoining regions initiated colonization of lower-ranked resource zones (Bramlette 1989:116). Analysis of obsidian-hydration data from surface-collected specimens supported the notion that year-round residential use of the area did not begin until the Emergent period (Bramlette 1989:123). Of the 112 obsidian-hydration rim values obtained for the study, 90% ranged from 1.0 to 3.0 microns (Napa Valley obsidian), while the remaining 10% ranged from 4.0 to 6.5 microns (Napa Valley). Bramlette (1989) argued that the low number of larger values indicated the project area was occupied only sporadically prior to 1000 B.P. It was recognized, however, that deposits dating to an earlier period might be buried within the project area (Fredrickson, ed. 1982; SSUAF 1993:48, 1994b:5).

Site Distribution and Settlement Patterns

In central California, researchers have often taken the distribution of late Holocene archaeological deposits as evidence for population increase during the upper Archaic and Emergent periods (e.g., Bouey 1987:66; Broughton 1994a, 1994b; Schulz 1981:184). Current models view these demographic changes

as attendant with more intensive subsistence strategies that may have led to increased organizational complexity (Basgall 1987; Beaton 1991; Bouey 1987; Broughton 1988, 1994a, 1994b; Jones 1992).

At first glance, the predominance of late Archaic and Emergent-period sites seems to support the notion of population increase in central California. It has been suggested that imbalances between population and resources during the middle Archaic were sufficient to have initiated the intensified economies characteristic of later adaptations (Basgall 1987; Beaton 1991; Bouey 1987; Broughton 1994a, 1994b; Jones 1992).While it is reasonable to assume that populations were higher during the Upper Archaic and Emergent periods, the impetus and trajectory of this population growth are poorly understood (Beaton 1991:950-951). This is primarily due to the absence of information from Lower and Middle Archaic archaeological deposits, against which such developments can be evaluated.

A number of researchers have acknowledged that large-scale changes in the central California landscape have likely buried older archaeological sites (Banks, Orlins, and McCarthy 1984; Beaton 1991:948; Bickel 1978; Fredrickson 1980; Jones 1992:8; Schulz 1981:184), and numerous examples of buried sites have been reported throughout central California (e.g., Banks, Orlins, and McCarthy 1984; Fredrickson 1966; Gerow with Force 1968; Heizer 1950; Wiberg 1988). The extent to which geological processes have biased site-distribution patterns, however, has yet to be systematically evaluated.

Buried Sites

Archaeological studies of the lowlands in Alameda and Contra Costa counties have directly or indirectly confronted the problem of archaeological visibility. Many of these studies were initiated when buried archaeological materials were uncovered by construction activities (e.g., Fredrickson 1966; Heizer 1950; Wiberg 1988, 1996). Work by Fredrickson (1980) and Banks, Orlins, and McCarthy (1984) has illuminated the problem of buried archaeological sites in the Walnut Creek drainage. In an archaeological overview of the region, Fredrickson noted that "a significant number of archaeological sites recorded within the . . . area apparently did not contain identifiable surface markings but were found buried beneath non-archaeological alluvial soils" (1980:5).

Following Fredrickson, Banks, Orlins, and McCarthy (1984) evaluated the age, depth, and distribution of 20 archaeological sites located primarily in the Walnut Creek floodplain. In their study, more than one-half (13) of these sites were buried or found to contain a buried cultural component overlain by sterile alluvium. Although not systematically studied, a similar situation is found in the Livermore Valley, where at least 6 buried archaeological sites have been discovered (Wiberg 1988:7, 1996).

Regionally, buried archaeological deposits have regularly been found in association with paleosols, demonstrating that human occupation is related to the availability of stable land surfaces. Banks, Orlins, and McCarthy (1984) recognized that at least four archaeological deposits in the Walnut Creek drainage (CCO-30, -137, -308, -431) were associated with "buried land surfaces" (paleosols), capped by culturally sterile alluvium. Excavations at several other sites in interior Contra Costa and Alameda counties have also revealed that buried archaeological sites and/or components are associated with paleosols (Bard et al. 1992; Holson et al. 1993; Waechter et al. 1995; Wiberg 1988, 1996). Components as young as 1000 B.P. are found buried in both the Walnut Creek and Livermore valleys (e.g., CCO-308, ALA-483). In both drainage basins, buried sites and components are associated with paleosols found as deep as 3.8 meters (12.5 ft.) below the surface (e.g., CCO-308, -431, ALA-483), yet are as young as 2730 B.P. (Banks, Orlins, and McCarthy 1984; Ericson 1977; Fredrickson 1966; Wiberg 1996). Based on this review, it appears that the timing of landform stability and sediment deposition is similar in separate valleys. This widespread patterning supports the contention by Banks, Orlins, and McCarthy that successive episodes of deposition and stability were "regional in scope" (1984:8.28). To examine whether these patterns might reflect large-scale geomorphic changes, a review of the regional geomorphic record is provided in the discussion that follows.

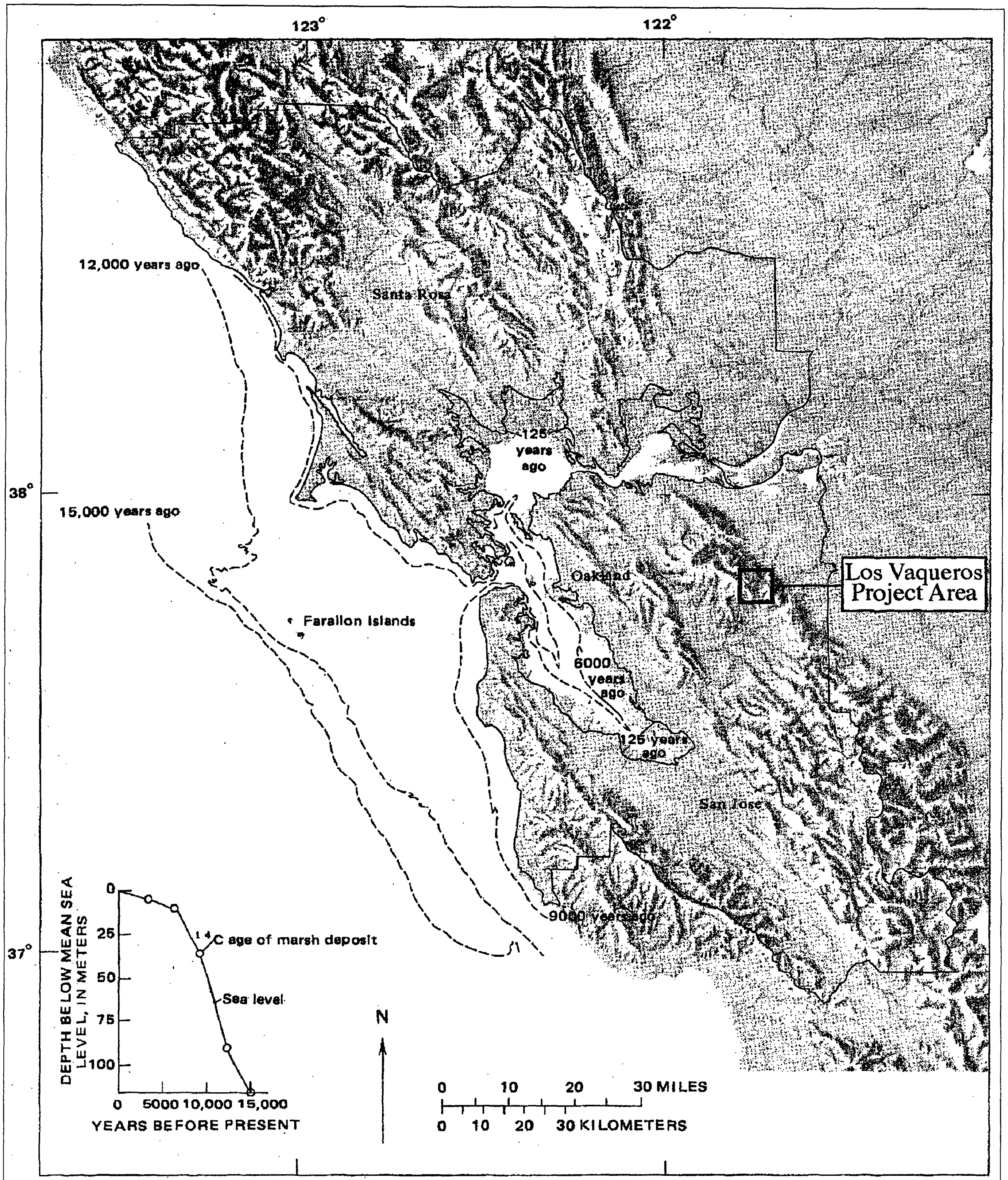

Figure II.1. The Timing and Extent of Holocene Sea-Level Rise in the San Francisco Bay Area (adapted from Helley et al. 1979:Figure 12).

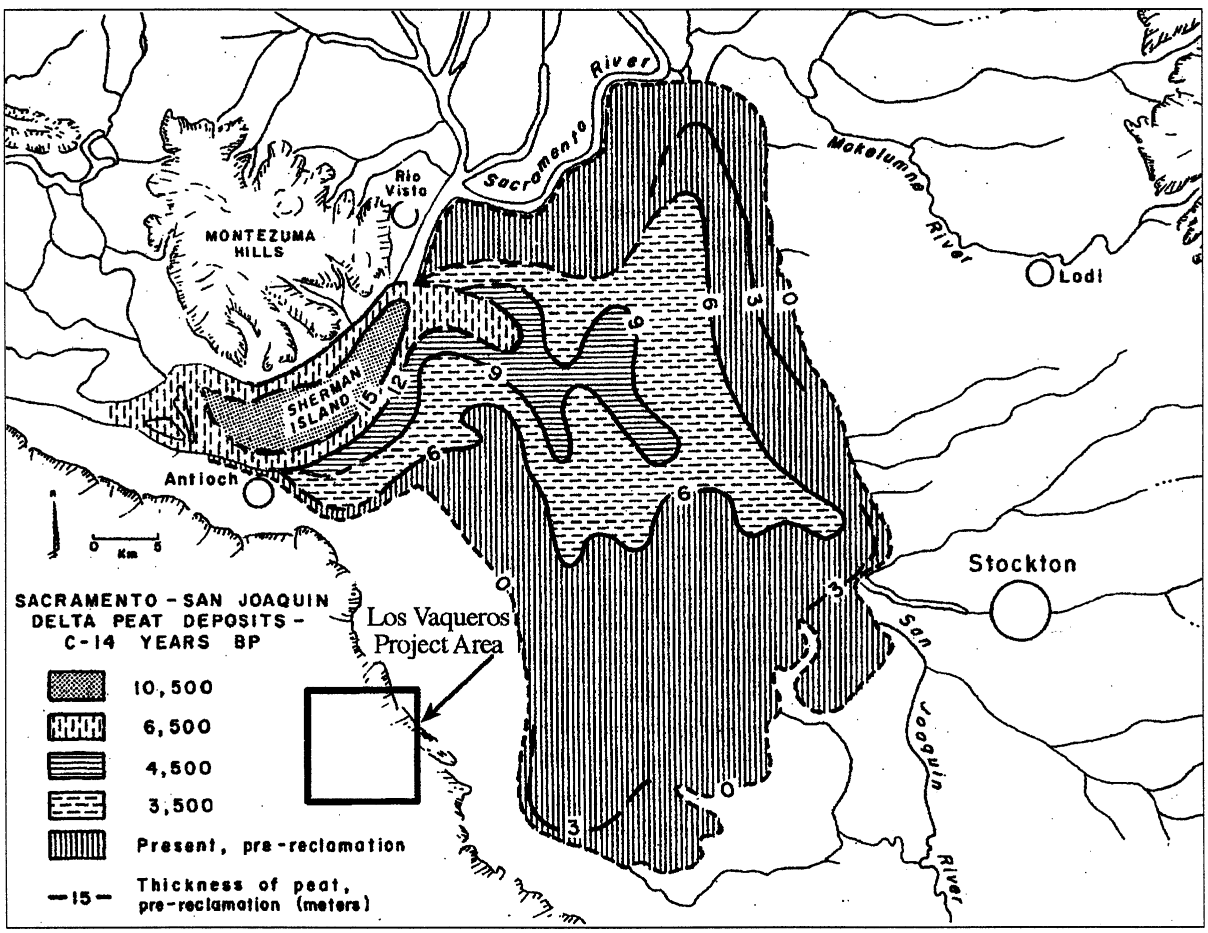

Figure II.2. Holocene Sea-Level Rise in Sacramento–San Joaquin Delta Area (adapted from Shlemon and Begg 1975:Figure 5).

GEOMORPHIC RECORD AND LANDSCAPE EVOLUTION

The Regional Record

Much of what is known about the geomorphic history of the region has been generated from geological studies of the San Francisco Bay, Sacramento–San Joaquin Delta, and surrounding lowlands. These studies indicate that the central California landscape has undergone a series of large-scale changes since the time that prehistoric people may have first inhabited the region. During the late Pleistocene, the San Francisco Bay–Delta was not yet in existence due to lower sea levels. At that time, the combined runoff from the Sacramento and San Joaquin rivers flowed through a single inland drainage before reaching the Pacific Ocean near the Farallon Islands (Atwater, Hedel, and Helley 1977). Toward the end of the Pleistocene, a relatively rapid rise in worldwide sea levels has been attributed to the melting of large continental ice masses. During the early Holocene, continued sea-level rise drowned many of the low-lying inland valleys in the Bay Area, creating a series of newly formed inland bays and tidal plains (Figure II.1).

Rising sea levels reached the western edge of the present Delta estuary about 7,000 years ago—around the same time that the rate of sea-level rise began to slow dramatically (Atwater 1980; Atwater, Hedel, and Helley 1977; Shlemon and Begg 1975; Wells 1995). The decrease allowed sedimentation to keep pace with submergence rates, permitting extensive tidal-marsh environments to become established in the Delta estuary during the middle Holocene, as shown in Figure II.2 (Atwater et al. 1979). By the 1850s, tidal marshes covered twice as much surface area as all of the inland water of the Bay and Delta combined (Atwater et al. 1979). Thus as a whole, the Sacramento–San Joaquin Delta estuary can be considered to be a relatively recent feature of the landscape, having evolved to its present configuration during the past 7,000 years.

Farther inland, the combination of rising water levels, emerging marshlands, and increasing sedimentation rates created higher baselines for streams entering the Bay and Delta. The lower reaches of many stream channels became choked with sediments that were eventually avulsed onto the surface of surrounding floodplains (Helley et al. 1979). At the same time, older landforms in the upper reaches were eroded by lateral channel migration as streams attempted to maintain constant gradients in response to rising baselines. This led to the formation of an "alluvial apron around the bay plain and the extensive valleys of the region" that are graded to the present sea level (Helley et al. 1979:18). As a result, many of the late-Pleistocene and early-Holocene land surfaces were overlain by extensive deposits of younger alluvium less than 5,000 years old. These older land surfaces generally exhibit well-developed buried soil profiles (paleosols) that mark a significant stratigraphic boundary in the region.

Although the lowlands surroundings the Sacramento–San Joaquin Delta estuary are not well dated, the general timing and evolution of the lowlands are similar to that found in the Bay Area. Following a period of nondeposition in the late Pleistocene and early Holocene, these lowlands began to fill with water, sediments, and marsh plants, thereby raising the baseline of stream and river channels entering the Delta during the middle Holocene (Figure II.3). Active channels responded by shifting their positions and depositing a significant amount of sediment over the older land surfaces. Large alluvial fans and prominent levee deposits were formed by channels—such as Marsh, Kellogg, and Sand creeks—that drain the eastern portions of Contra Costa County (Atwater 1982; Brabb, Sonneman, and Switzer 1971). In the Marsh Creek drainage, these younger alluvial deposits are estimated to range from late Pleistocene to late Holocene in age (Atwater 1982). These Holocene deposits are estimated to range in thickness from 15.0 meters (m) near alluvial fan heads, to 3.0 m near the Delta and Bay margins (Helley et al. 1979). Although these studies are useful for reconstructing regional geomorphic history, they provide little information regarding local changes in specific landscapes.

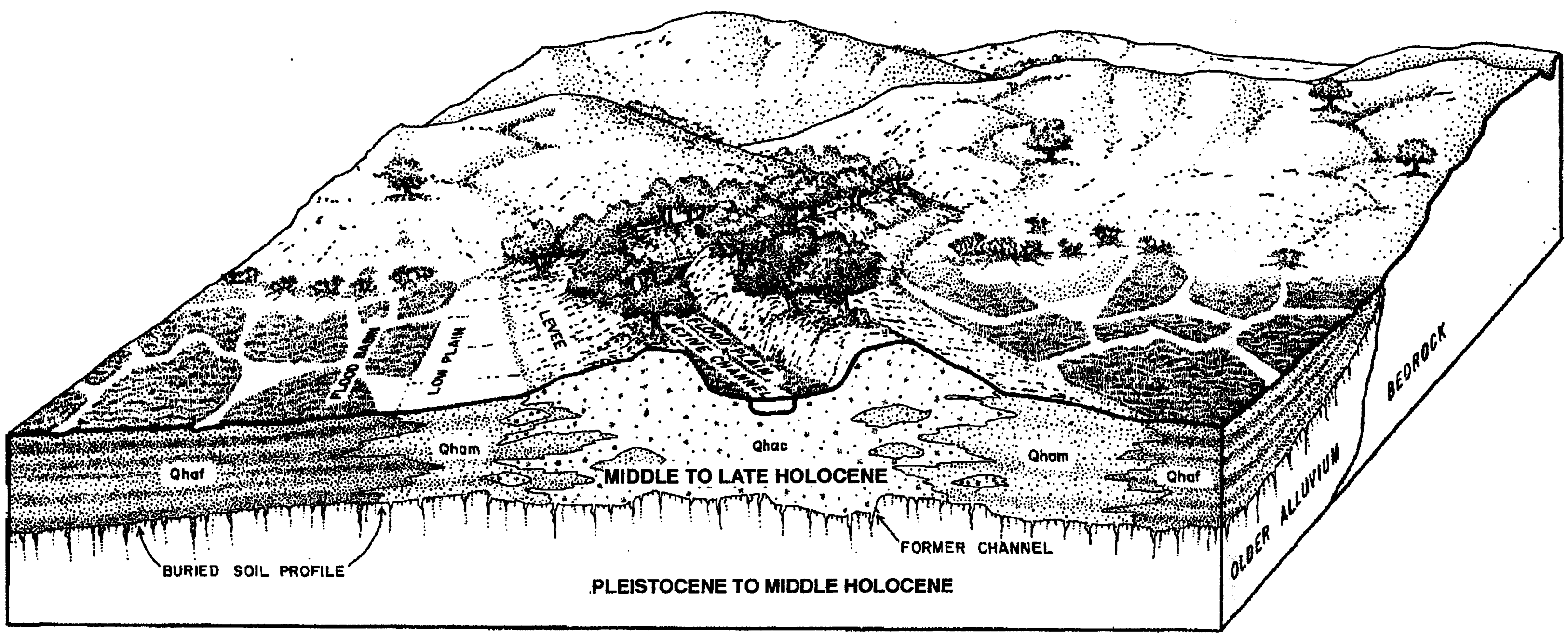

Figure II.3. Typical Relationship of Older and Younger Alluvial Deposits in the San Francisco Bay Area (from Helley et al. 1979:19).

Only a few geological studies have evaluated the age and geomorphic history of alluvium-filled valleys in the interior portions of Contra Costa County. These studies also found that Holocene-age alluvium unconformably overlies older alluvium in many of the valleys. These studies recognize three distinct periods of alluvial filling (7800 B.P., 4800 B.P., and 1200 B.P.) and two significant periods of channel entrenchment in the middle and late Holocene (Pape 1978; Rogers 1988). The thickness of the Holocene fills in these valleys is judged to be at least 3.0 to 4.5 m (Wigginton and Carey 1982:214), but may be as great as 30.0 m in some valleys (Pape 1978).

Landscape Evolution at Los Vaqueros

A subsurface archaeological survey was conducted as part of the Los Vaqueros Project (Meyer 1996a, 1996b) along portions of the pipeline route that extends from the reservoir area in the upper Kellogg Creek drainage to a pumping plant near Antioch in eastern Contra Costa County. The study was designed to evaluate the timing and magnitude of landscape evolution in order to estimate the potential for encountering buried archaeological resources along the route. The potential for buried sites was estimated according to the following factors: (1) the presence or absence of an intact paleosol buried at some time during the Holocene; (2) the presence or absence of a present or former watercourse; and (3) the relative or absolute amount of time that a paleosol was available for human occupation. Backhoe trenches were excavated in the floodplains of six separate valleys along the route to (1) determine the sequence of landform-sediment assemblages in each floodplain; (2) identify and date buried paleosols; and (3) test for the occurrence of buried archaeological deposits. The radiocarbon ages of 10 samples were obtained from six different locations to establish the depositional history and the age of buried paleosols found along the route.

This study found that one or more paleosols had been buried by younger alluvium in five of the six valleys surveyed along the route (upper Kellogg Creek, middle Kellogg Creek, Marsh Creek, Dry Creek, and Lone Tree Valley). Radiocarbon analyses determined that 9 of the 10 dated paleosols were Holocene in age. The paleosols were found to range in depth from 70 to 440 cm below the present ground surface, with an average depth of 164 cm, which is close to the average depth (141 cm) of buried sites noted by Banks, Orlins, and McCarthy (1984) in the San Ramon Valley. Each of the buried paleosols was found to have great lateral continuity, suggesting that nearly continuous land surfaces are represented beneath the surface of these valley floodplains (Meyer 1996b).

A comparison of the radiocarbon ages from deposits along the Los Vaqueros Project pipeline routes indicates that periods of prolonged soil formation (landform stability) occurred as follows:

- late Pleistocene (14,500 cal B.P.)
- early Holocene (8965 - 8535 cal B.P.)
- middle Holocene (5530 - 5304 cal B.P.)
- late Holocene (3500- 2145 cal B.P.).

It was inferred that these stable periods were interrupted by shorter episodes of deposition (landform instability) that appear to coincide with intervals of environmental transition as follows:

- late Pleistocene to early Holocene (11,000 B.P.)
- early to middle Holocene (7000 B.P.)
- middle to late Holocene (3500 B.P.)

Although slight variations are apparent in the timing of these processes, comparisons show that the alluvial sequences are roughly synchronous between the valleys of eastern and western Contra Costa County. Similarities in the age of alluvial sequences found among widely separate valleys suggest that geological processes have structured the temporal range and spatial distribution of archaeological materials in these valleys (Meyer 1996b).

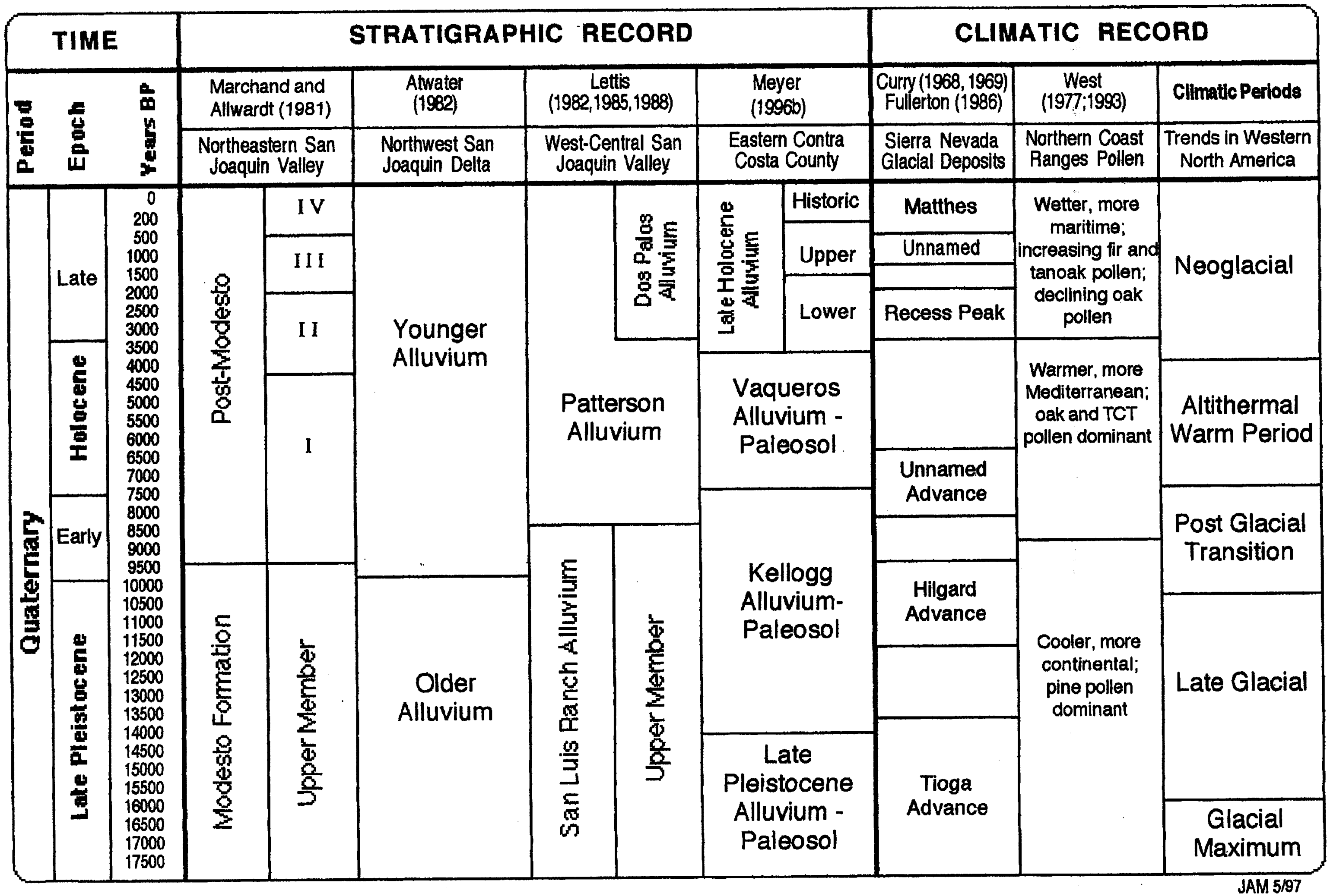

Figure II.4. Correlation of Regional Stratigraphic and Climatic Records

Certain geological studies in the region have identified one or more depositional cycles in late Quaternary alluvium (Atwater 1982; Lettis 1982, 1985, 1988; Marchand and Allwardt 1981). Although these studies generally lack sufficient age control to permit confident correlations between separate areas, preliminary comparisons show a general correlation between the pipeline study findings, and the previous stratigraphic and climatic sequences proposed for the region (Figure II.5). The depositional sequence identified in eastern Contra Costa County is similar to that identified in northeast San Joaquin Valley, in which four distinct Holocene-age allostratigraphic units are recognized (Marchand and Allwardt 1981). Likewise, there appears to be a strong correlation between the depositional record and changes in the paleoenvironmental record of the region, particularly during the late Holocene (Curry 1968, 1969; Fullerton 1986; Moratto, King, and Woolfenden 1978; Scuderi 1984). Furthermore, the nature and timing of late Holocene deposition is remarkably similar to that found in the valleys of western Contra Costa County (Banks, Orlins, and McCarthy 1984; Pape 1978; Rogers 1988).

Based on these regional comparisons, the depositional sequence identified by the pipeline study appeared to reflect a series of climatically induced landscape changes that occurred throughout much of central California. Assuming that large-scale environmental changes were responsible for the formation of this sequence, then similar depositional sequences may be expected in other valleys of the region. If this is true, these findings are not unique to eastern Contra Costa County, but may also apply to other areas where similar conditions prevailed (Meyer 1996b).

Evidence from the pipeline study suggests that extended periods of floodplain stability would have encouraged human land use in the valleys and, thus, the formation of archaeological sites. Shorter episodes of floodplain instability would have temporarily discouraged or disrupted human occupation in many valleys and would have resulted in the burial or destruction of previous occupation evidence. Archaeological materials from more than one cultural group and/or time may have been superimposed on a single landscape during stable periods. Stable landscapes that were available for prehistoric settlement and material discard during the late Pleistocene and Holocene were partially eroded and buried during subsequent unstable episodes. The alternation between stable and unstable landform processes has resulted in the differential preservation and/or visibility of archaeological materials associated with these past landscapes (Meyer 1996b).

These geological studies confirm that many land surfaces that were available for prehistoric human occupation have been buried by younger alluvium in many lowland valleys of the region. The studies also indicate that older landform segments have been destroyed by channel incision and/or migration, particularly in the upper reaches of some drainages. It is evident that geoarchaeological studies are needed to systematically identify specific geological contexts that may contain older archaeological sites in order to better evaluate current models of prehistoric demographic change and settlement patterns proposed for central California.

SUMMARY

The discussion above has outlined the theoretical and methodological issues that make up the analytical and interpretive framework adopted by this study, which recognizes that the archaeological record is in part the result of regional landscape evolution. This viewpoint interprets the landscape as being a product of large-scale geological processes that have contributed to the present distribution, preservation, and visibility of the archaeological record. The perspective requires an understanding of the regional geomorphic record, as well as a systematic methodology that can identify and sample specific landform contexts for archaeological deposits of different ages. This framework provides a justification for selecting a geoarchaeological approach to address these issues in Los Vaqueros Project area.

RESEARCH ISSUES IN THE LOS VAQUEROS AREA

As a part of the early phases of the Los Vaqueros Project, a research design was developed by Co-Principal Investigator David Fredrickson and other Anthropological Studies Center personnel to guide National Register evaluation of the recorded prehistoric archaeological sites in the project area (SSUAF 1992). Since that time, the number of known prehistoric sites in the project area has increased as a result of the Subsurface Survey and construction monitoring, while understanding of the prehistory in the Los Vaqueros area has been substantially revised through the archaeological data-recovery investigations, burial removal, and subsequent analysis. The complexity of the project area has increased dramatically, while the time depth of the local area now rivals that of central California as a whole. Despite such significant reorientation, the basic issues developed in the evaluation research design half a decade ago have continued to guide the interpretation of the archaeological features and artifact assemblages, as well as attempts to reconstruct regional prehistory.

The 1992 report stressed the importance of the district approach, which viewed the Los Vaqueros Project as a research universe that conforms to a watershed, in assessing NRHP evaluation. The approach requires evaluating each cultural locus within the district in terms of its ability to address research questions considered germane to identified research issues for the area. The outcome of such an approach can result in identifying individual sites that, while not significant on an individual basis, might be judged significant in the context of a district. The watershed is a particularly relevant study area for central California prehistory, in that it likely was held by a single sociopolitical group, at least during the latest prehistoric periods. Thus there is the potential to capture important elements of the same settlement system.

The evaluation document identified three research issues from which a prehistoric archaeological site's significance could be appropriately investigated within the context of a district. These broad issues, discussed in some detail in the evaluation report (SSUAF 1992:41-53), are chronology and culture history, subsistence–settlement, and exchange and interaction. Another domain of considerable interest—social group organization—is often unapproachable at California archaeological sites, where large lots of burials are seldom investigated and mixed midden deposits often do not allow seriation of individuals. The large number of burials from Los Vaqueros, and the good stratification of many of these finds, indicate that the evolution and nature of social organization can indeed be addressed through analysis of Los Vaqueros data.

CULTURAL SEQUENCE IN THE LOS VAQUEROS PROJECT AREA

Situated in a rugged area between the Sacramento–San Joaquin Delta and the San Francisco Bay Area, Los Vaqueros does not fit neatly into the Central California Taxonomic System (CCTS), which has been applied to these two regions for nearly six decades (Beardsley 1948, 1954; Bennyhoff and Hughes 1987; Bouey, ed. 1995; Lillard, Heizer, and Fenenga 1939; Milliken and Bennyhoff 1993). While several broad criticisms have been waged against the scheme, the least debatable is the fact that CCTS's "Early" horizon begins some 5,000 years after the known initial settlement of the region. The awkwardness of that expression was recognized at the beginning, as it was understood that alluvium had likely buried all earlier sites on the valley floors (Lillard, Heizer, and Fenenga 1939:76; Schenck and Dawson 1929). Researchers may have been willing to ignore the problem because it appeared unlikely that much more than hints of that earlier time period would ever be recoverable.

For a project that is now known to reflect nearly the full temporal spectrum of human occupation of the region, it is appropriate to use a more encompassing sequence. This is Fredrickson's (1973, 1974, 1984) scheme, which combines the use of temporal *periods*—broad spans during which a particular adaptive mode was in prominence, affecting settlement, subsistence, and technology—while the *pattern* represents shared economic and social traits that are distributed over a broad area, "comparable to what might be called the 'maximum interaction sphere'" (Fredrickson 1994a:77).

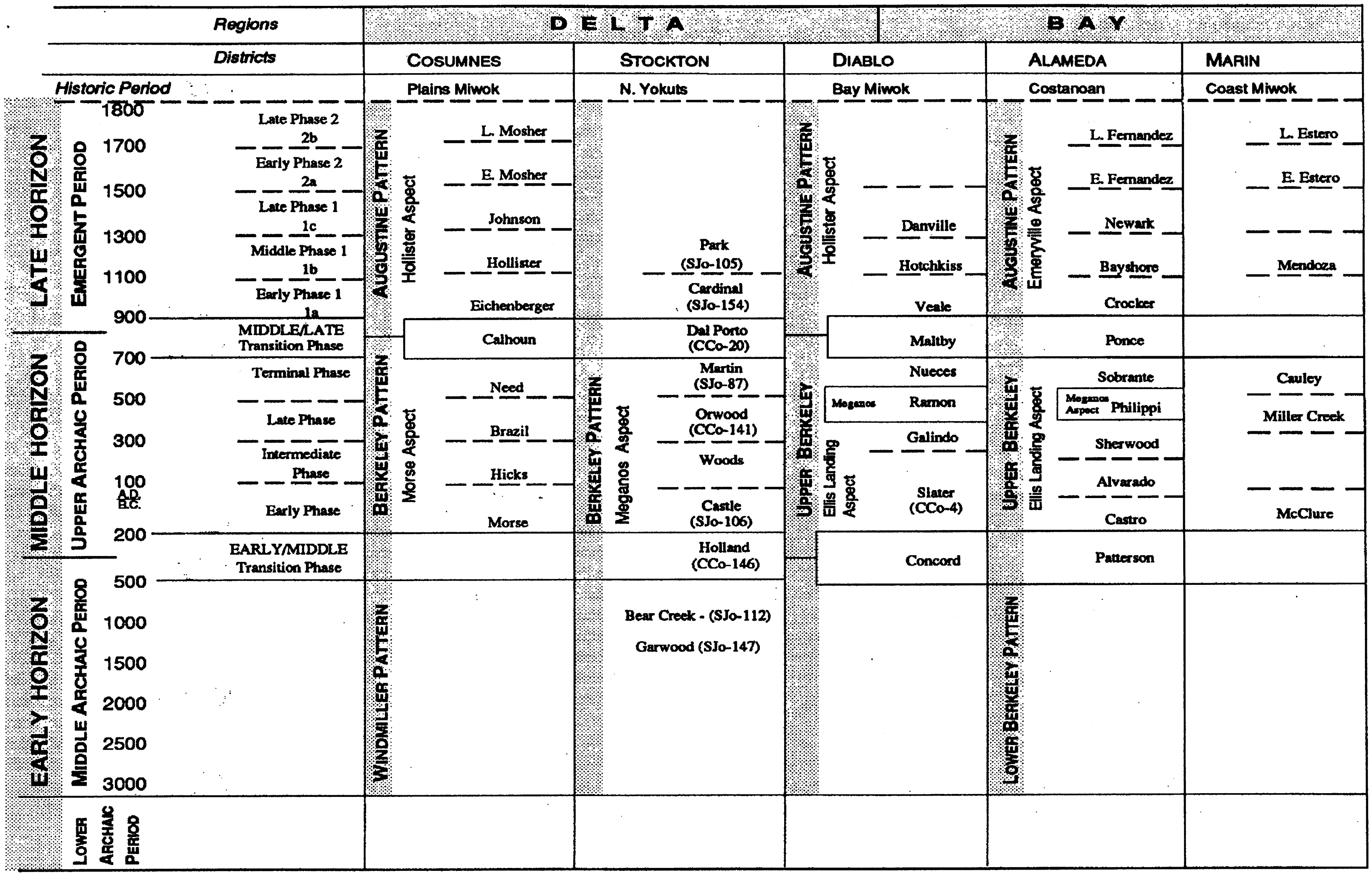

Figure II.5. Bennyhoff and Fredrickson's Taxonomic Framework in Relation to the Central California Taxonomic System (from Bennyhoff 1994b)

The problem is made especially clear in Figure II.5, which compares the CCTS with Fredrickson's scheme. Los Vaqueros would fall into the southern extreme of Fredrickson and Bennyhoff's Diablo district, which appears in the figure to have been unpopulated until about 500 B.C. (2500 B.P.). The identified cultural patterns and aspects (local variants of a pattern) first appear with the onset of the Upper Archaic period—at a time when Kellogg Creek valley had been occupied, at least on a sporadic basis, for as much as 7,000 years. Thus Fredrickson's scheme for central California as a whole is far more applicable and will be used in this volume. Before leaving the CCTS, however, it is worth noting the kind of temporal specificity that has been achieved through the approaches taken with the CCTS over the past decades. By focusing on the minute seriation of cultural traits, primarily those associated with large burial lots, James A. Bennyhoff and a handful of other researchers have identified chronological signatures (often shell-bead types) for 200- to 300-year phases over the past 2,500 years. While several critics have noted the small sample sizes used for some of these identifications and a major study has found other inconsistencies (Bouey, ed. 1995), dating in accordance with shell-bead types and some other distinctive temporal markers has been found to yield highly accurate results.

Table II.1 (reproduced from Fredrickson 1994b) offers a brief summary of the material-culture traits associated with these archaeological periods, some social features that are inferred from the archaeological record, and a recounting of some of the presumed influences that affected change at the onset of these periods—the two most readily attributed being climate change and population pressure.

TABLE II.1
HYPOTHESIZED CHARACTERISTICS OF CULTURAL PERIODS IN CALIFORNIA

Hypothesized Characteristics of Cultural Periods in California		
1800 Emergent Period	Upper	Clam disk bead money economy appears. More and more goods moving farther and farther. Growth of local specializations re: production and exchange. Interpenetration of south and central exchange systems.
1500	Lower	Bow and arrow introduced, replace dart and atatl; south coast maritime adaptation flowers. Territorial boundaries well established. Evidence of distinctions in social status linked to wealth increasingly common. Regularized exchanges between groups continue with more material put into the network of exchanges.
1000 Archaic Period A.D. B.C.	Upper	Growth of sociopolitical complexity; development of status distinctions based on wealth. Shell beads gain importance, possibly indicators of both exchange and status. Emergence of group-oriented religious organizations; possible origins of Kuksu religious system at end of period. Greater complexity of exchange systems; evidence of regular, sustained exchanges between groups; territorial boundaries not firmly established.
500	Middle	Climate more benign during this interval. Mortars and pestles and inferred acorn economy introduced. Hunting important. Diversification of economy; sedentism begins to develop, accompanied by population growth and expansion. Technological and environmental factors provide dominant themes. Changes in exchange or in social relations appear to have little impact.
3000	Lower	Ancient lakes dry up as a result of climatic changes; milling stones found in abundance; plant food emphasis, little hunting. Most artifacts manufactured of local materials; exchange similar to previous period. Little emphasis on wealth. Social unit remains the extended family.
6000 Paleoindian Period 8000	Upper	First demonstrated entry and spread of humans into California; lakeside sites with a probable but not clearly demonstrated hunting emphasis. No evidence for a developed milling technology although cultures with such technology may exist in state at this time depth. Exchange probably ad hoc on one-to-one basis. Social unit (the extended family) not heavily dependent on exchange; resources acquired by changing habitat.

CHAPTER 4
SUBSURFACE SURVEY IN THE RESERVOIR AREA

INTRODUCTION

The methods of the subsurface survey grew out of the concerns addressed in the Analytical Interpretive Framework, above. When the work resulted in the identification of a buried archaeological deposit, some project redesign based on the geoarchaeological findings was undertaken to avoid other highly sensitive areas. The chronostratigraphic units that were identified as a result of field inspection and analysis of radiocarbon age determinations served to guide further work in the reservoir area; the chronostratigraphic units are described below.

RESERVOIR AREA

The reservoir area includes all of the land surface that will be inundated by water in the upper Kellogg Creek drainage basin. The flood pool is designed to have a storage capacity of 100,000 acre-feet, which will cover about 1,500 acres at a maximum flood-pool elevation of 472 feet above mean sea level (AMSL). The reservoir area is described here as it appeared in 1995, when the survey was initiated.

The drainage basin is bounded by steep to moderate hillslopes underlain by Cretaceous sandstone, siltstone, and claystone of the Panoche formation. The hillslopes are mantled by colluvial deposits and residual soils that thicken downslope and merge with alluvial/colluvial fan deposits. The moderately to gently sloping fans extend into the valleys, where they merge imperceptibly with the nearly level alluvial floodplain deposits. Kellogg Creek and its tributaries form a network of stream channels, some of which are entrenched as much as 6 meters (almost 20 ft.) into the floodplain deposits. At least two discontinuous alluvial stream terraces are inset within the main Kellogg Creek channel: the lower terrace stands about 50 centimeters (about 20 inches) above the active channel, while the upper terrace stands about 150 cm above the active channel.

SURVEY METHODS AND SAMPLING BIAS

Archaeologists have traditionally relied on the use of surface surveys as a means of searching an area for archaeological site locations (Dunnel and Dancey 1983). With the increasing regional orientation of archaeological research, the survey is viewed as a fundamental sampling method that permits the discovery of unknown sites, while providing data for assessing site location and discovery probability (McManamon 1984; Nance 1983). Different environmental conditions often demand the application of appropriate survey techniques and sampling strategies to increase discovery probabilities (Schiffer, Sullivan, and Klinger 1978:8). If it is recognized that buried sites are probably always underrepresented in survey samples (Nance 1983:349), the difficulty of locating buried sites can be confronted as a sampling problem as part of the survey design (McManamon 1984). A *buried site* refers to any relatively intact archaeological material that is concealed from view by a distinct and/or significant deposit of natural sediments. The design of a survey should not only consider the possibility of buried sites, but also address the probability of discovering buried sites in different parts of the study area.

The probability that a buried site will be discovered depends on two important factors: visibility and obtrusiveness. *Visibility* is the extent to which a site has been buried or covered by soil aggradation and vegetation since its last occupation (McManamon 1984:224). The *obtrusiveness* of a site determines the probability that particular archaeological materials can be discovered by a specific technique (Schiffer, Sullivan, and Klinger 1978:6). *Discovery probability* is the likelihood that cultural remains of interest will be detected within a sampling domain or sampling deposit using a specified sampling procedure, given a certain level of sampling effort (Nance 1983:292). Because buried sites generally

lack visible and/or obtrusive features that would otherwise indicate their presence to an observer in the field, the use of pedestrian survey methods is often inefficient or completely ineffective for locating buried archaeological sites (Bettis 1992:120). Surveys that are designed to locate and estimate the potential of buried sites must rely on other methods and techniques to avoid the sampling biases introduced by traditional surface surveys.

A wide variety of methods, techniques, and sampling strategies have been proposed for locating buried sites, though not all of them are equally appropriate or effective in all situations (McManamon 1984:224). Archaeologists have used shovel tests, hand and power augers, tractor-mounted backhoes, and/or mechanical coring devices to test for buried sites. The selection of an effective technique is dependent on expectations regarding the probable nature of the archaeological materials and the type of deposits that must be searched. Various augers and coring tools can be used to test buried deposits that occur at depths of 20 to 100 cm; for sites that are buried by more than 100 cm of noncultural sediments, it is often necessary to use a backhoe or other powered equipment (Schiffer, Sullivan, and Klinger 1978). The excavation of test trenches using a backhoe is common practice in geoarchaeological studies, not only because it is more time and cost effective than manual excavations, but also because the trenches provide an excellent source of geomorphological information.

THE SUBSURFACE SURVEY

There are many studies that illustrate the design and application of a subsurface survey for the purpose of locating and predicting the contexts of buried sites (Artz 1985, 1995; Bettis 1992; Bettis and Benn 1984; Bettis and Hajic 1995; Bettis and Littke 1987; Gardner and Donahue 1985; Hajic 1985; Mandel 1992, 1995; Mandel et al. 1991; Stafford 1995; Stafford and Hajic 1992; Waters 1988). Each study was designed to evaluate the relationships between landscapes and the location of archaeological sites, using a similar combination of research methods and field techniques for testing subsurface deposits. The primary purpose of this type of study is to develop models of site distribution and preservation that estimate the potential for buried sites—not to locate every site that may be buried in the study area. This is generally done by establishing the temporal relationship of deposits and landforms on the basis of stratigraphy and the degree of soil formation. Radiocarbon dating is often critical for resolving the absolute age of the deposits, especially when archaeological materials fail to provide useful chronological controls (Bettis and Benn 1984). Deposits and landforms that are genetically and temporally related are grouped into landform–sediment assemblages (Bettis 1992:133). The ability of the model to locate buried sites depends on the age and distribution of those landform–sediment assemblages that can be adequately tested for evidence of past human occupation.

Many of the findings made by previous geoarchaeological studies are relevant for the subsurface survey in the Los Vaqueros area. For example: (1) "the spatial distribution of artifacts across the landscape is a function of the scale of landforms and the arrangement of landscape elements that served as stopping points (places) on those landforms" (Stafford and Hajic 1992:158); (2) "the buried archaeological record is generally subject to many of the same processes that affect the modern surface record," such as the long-term accumulation of cultural materials on a single geomorphic surface (Stafford 1995); (3) "the landscape is dynamic and can change in a relatively short period of time" (Bettis and Benn 1984:223); (4) the nature and distribution of subsurface deposits are often unrelated to deposits at the surface (Hajic 1985:135); (5) certain landforms are either too young or too old to contain buried sites (Gardner and Donahue 1985; Mandel 1995); (6) erosion has created gaps in the archaeological record (Kuehn 1993; Mandel 1992; Waters 1988); and (7) the age and distribution of landform–sediment assemblages may differ significantly from one area to the next (Artz 1985; Mandel 1992, 1995).

SUBSURFACE SURVEY DESIGN

The subsurface survey of the reservoir area focused on those parts of the landscape where large-scale construction excavations were proposed—the dam footprint, the borrow pit, the diversion dam, and the diversion canal (Figure II.6). Each of these areas was located within the upper Kellogg Creek floodplain. The initial phase involved a review and assessment of available information regarding the archaeology and geology in the reservoir area. This was followed by field visits to assess the accuracy of published information and to examine natural cutbanks and other exposures for buried paleosols and archaeological materials. The findings of the initial phase were used to differentiate Holocene from pre-Holocene landscape segments. During the testing phase, backhoe trenches were excavated to expose subsurface deposits and provide the opportunity for buried-site discovery. Expectations regarding landform–sediment assemblages and buried sites were evaluated to further refine field testing strategies. In the final phase, a particular landform–sediment assemblages were tested to determine the presence or absence of buried archaeological materials in specific areas.

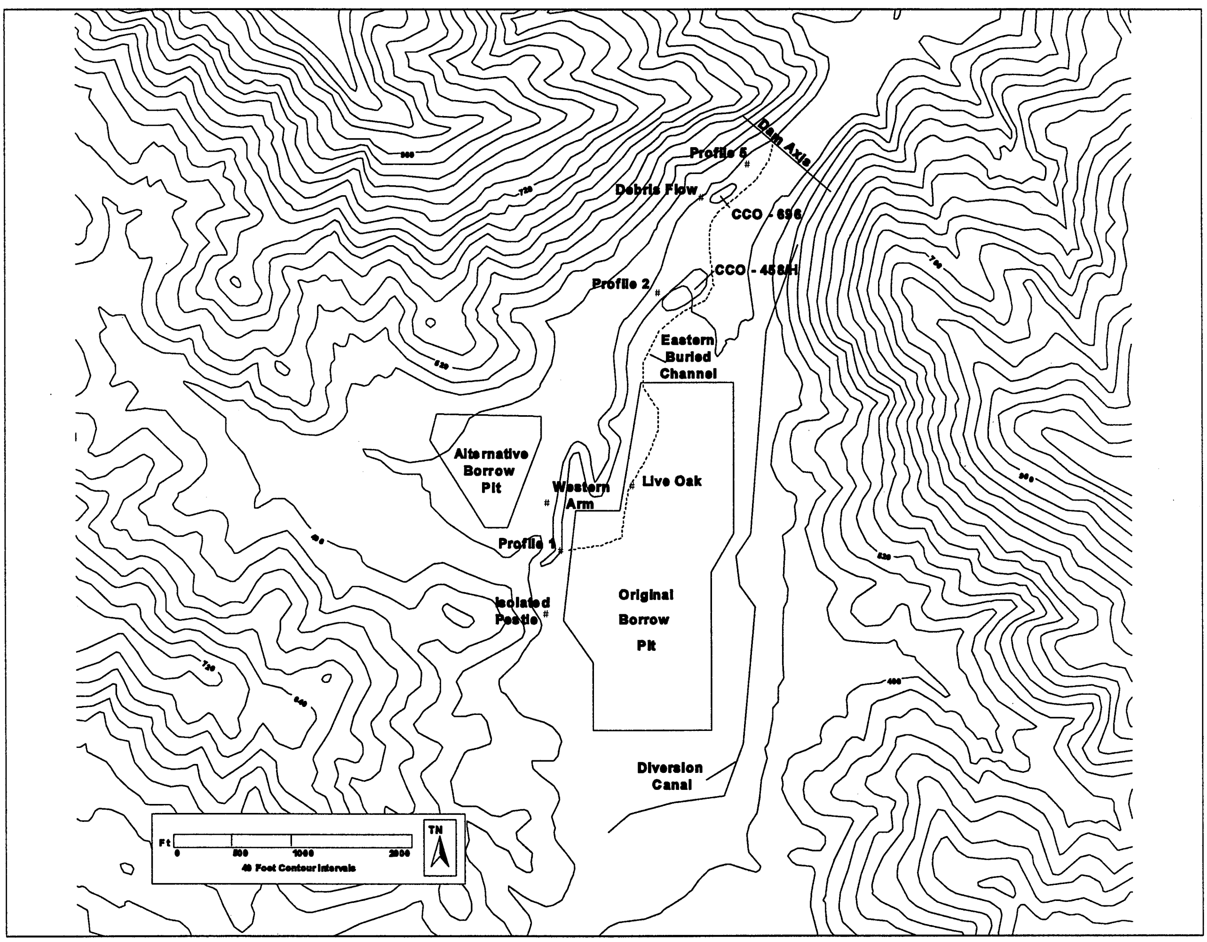

Figure II.6. Locations of Subsurface Survey Investigations, Reservoir Area

The survey area was divided on the basis of surface indicators such as soil type, geology, and geomorphic position into (1) hillslope segments—moderately to steeply sloping hills and footslopes underlain by Cretaceous bedrock and colluvial deposits; and (2) valley segments—moderately to gently sloping fans and level floodplains underlain by alluvial deposits, as depicted in Figure II.7.

It was determined from the literature search that subsurface testing would not be required in the hillslope portions of the reservoir area. The hillslopes consist of deposits that predate human existence, and are areas where erosion has been the dominant geological process. Soil is formed on the hillslopes by the weathering of bedrock in place, and by the accumulation of colluvial deposits downslope. The formation and burial of stable land surfaces are discouraged by the continuous movement and erosion of the hillslope deposits. Likewise, the systemic context of archaeological materials associated with the hillslope deposits is likely to be disturbed or destroyed by these processes. Given these factors, the hillslopes appeared to lack the potential for containing buried archaeological deposits and were therefore excluded from the subsurface survey.

The occurrence of active and inactive watercourses was also evaluated as part of the survey. Assuming that animals and people were regularly influenced by the need for fresh water, it is likely that active watercourses were focal points for human land use and settlement location in the past. Given this, landscapes located near active or formerly active watercourses were expected to have higher frequencies of archaeological materials than the remaining portions of the same landscape. In addition, it was expected that periodic overbank flooding and sediment deposition along active watercourses would have buried of archaeological materials associated with the adjacent landscapes. Following this reasoning, valley segments that contained active or formerly active watercourses and that appeared to have the potential for containing buried archaeological landscapes were targeted for subsurface testing.

Estimating Buried Archaeological Potential

The potential for buried archaeological resources was estimated on the basis of the following criteria: (1) the presence or absence of a paleosol buried at some time during the Holocene; (2) the apparent preservation or erosion of the surface of a buried paleosol; (3) the relative or absolute time interval of landform stability represented by a paleosol; (4) the presence or absence of a present or former watercourse; and (5) the relative proximity of a buried paleosol to a present or former watercourse. The buried archaeological potential of a given location was rated using the qualitative application of these criteria to the actual conditions observed in the reservoir area.

The following factors were considered to *increase* the potential for buried archaeological materials: (1) the occurrence of at least one paleosol buried during the Holocene; (2) the preservation of a buried paleosol surface; (3) a long period of paleosol stability before burial; (4) the occurrence of a present or former watercourse; (5) the proximity of a buried paleosol and a present or former watercourse; and (6) the occurrence of archaeological materials associated with the same landform– sediment assemblage at nearby locations.

The following were considered to *decrease* the potential for buried archaeological materials: (1) the absence of a paleosol buried during the Holocene; (2) the presence of a buried paleosol that had been truncated by erosion; and (3) areas that lacked evidence of an active or inactive watercourse.

Landform–sediment assemblages (LSAs) that did not contain a buried Holocene paleosol were estimated to *lack* the potential for containing buried archaeological resources. LSAs that contained an intact Holocene paleosol were estimated to have a *low* potential for containing buried archaeological resources. LSAs that contained an intact Holocene paleosol located near an active or inactive watercourse were estimated to have a *moderate* potential for containing buried archaeological resources. LSAs that contained intact archaeological materials and an intact Holocene paleosol located near an active or inactive watercourse were estimated to have a *high* potential for containing additional buried archaeological resources.

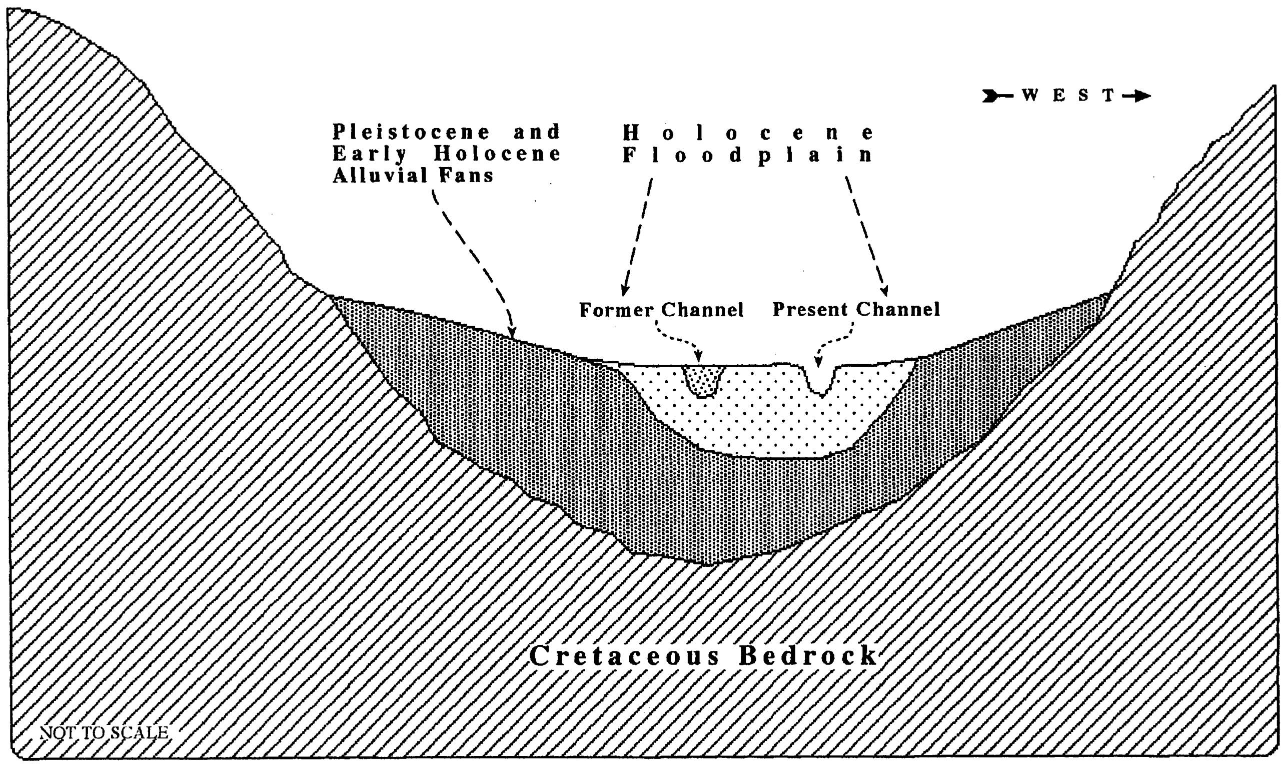

Figure II.7. Schematic Cross Section of the Kellogg Creek Valley Showing the Relationship of Major Landforms in the Reservoir Area.

Field Methods

The field investigations involved a preliminary check to confirm the accuracy of published information and to examine natural cutbanks and excavated exposures for buried paleosols and archaeological materials. Test trenches were excavated at approximately 80 locations within the reservoir area using a tractor-mounted backhoe. The amount of trenching in any one area was limited by conditions of physical access, environmental clearance, and the nature and/or extent of the deposit. The dimensions of each trench were from 3 to 10 m in length, 1 to 4 m in depth, and at least 60 cm in width.

The stratigraphic relationship of alluvial landforms in the reservoir area was tested in the field by physically examining the deposits exposed in the test trenches. The occurrence of archaeological materials was determined by spot-checking the deposits as they were removed from test trenches and by examining trench cross sections whenever practical. The depth and general nature of the deposits were recorded in the field, with additional attention given to those deposits that contained buried paleosols or archaeological materials. The initial findings were used to further develop and refine survey strategies while still in the field. Specific locations were later targeted to determine the presence or absence of buried archaeological materials and to establish the sequence of LSAs.

Buried paleosols were recognized in the field on the basis of color, structure, horizon development, bioturbation, lateral continuity, and the nature of the upper boundary or contact with the overlying deposit, as described by Birkeland, Machette, and Haller (1991) and Retallack (1988). Buried paleosols may or may not have exhibited an A horizon darkened by organic matter. In the case of truncated paleosols, some or all of the A horizon had been removed by erosion. Generally, the accumulation of clay or carbonates in the paleosol creates a B horizon that exhibits a distinct angular blocky structure. Paleosols often exhibit inactive root or insect holes and other indications of bioturbation. Since paleosols form during periods of pervasive land stability, the surface of a buried paleosol represents a stratigraphic unconformity that is often marked by an abrupt upper boundary, or in some cases, stone lines. Paleosols often have extensive horizontal continuity that permits them to be traced laterally as stratigraphic markers.

Deposits were divided into allostratigraphic deposits defined by laterally traceable discontinuities marked by erosional disconformities and buried paleosols. Two extensive allostratigraphic deposits were assigned informal names to aid in their identification and to simplify the discussion. The Kellogg alluvium and/or Paleosol refers to the lower and older deposit, while the Vaqueros alluvium and/or Paleosol refers to the upper and younger deposit.

Soil and sediment samples and radiocarbon samples were recovered in the field and processed in the laboratory using the methods described under Field and Laboratory Methods, above.

NATURAL CUTBANK SURVEY

Natural cutbank exposures in the modern Kellogg Creek channel were examined for archaeological materials and to determine the nature and extent of the subsurface deposits. The deposits exposed in five natural cutbanks were selected for detailed documentation and sampling in the field. All five were located upstream from the proposed dam along the active creek channel. The cutbank exposures ranged from about 3 to 7 m in depth.

PROFILE 1 (BORROW-PIT AREA)

Figure II.8 depicts the deposits exposed in a cutbank on the east side of Kellogg Creek approximately 1,220 meters southwest of the proposed dam axis. The location was selected because a sequence of alluvial deposits had been exposed to a depth of 350 cm in the cutbank. The cutbank was cleared, documented, and sampled in the field as Profile 1.

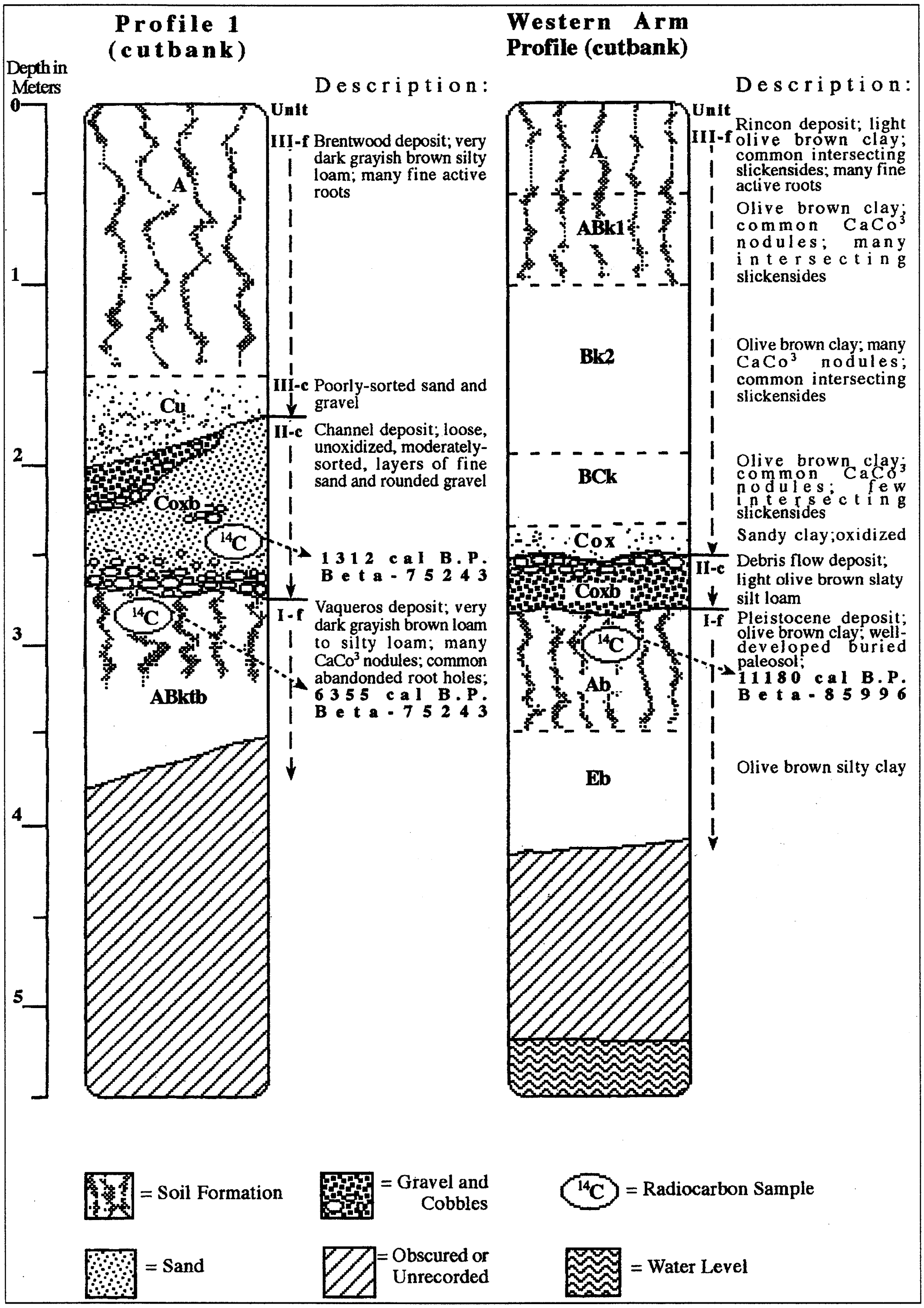

Figure II.8. Cutbanks along Kellogg Creek Showing Profile 1 and Western Arm Profile in Borrow-Pit Area.

Three allostratigraphic deposits were recognized in Profile 1 as shown in Figure II.8. Deposit I-f consisted of floodplain alluvium that exhibited a well-developed (Bktb) soil profile representing the Vaqueros paleosol. The upper portion of deposit I-f was truncated by the overlying deposit, indicating that the A horizon had been removed by erosion. Deposit II-c consisted of highly variable deposits of sand and gravel that represented an abandoned stream channel. Deposit III-f consisted of floodplain alluvium that exhibited a weakly developed (A/C) soil profile representing the Brentwood deposit. No archaeological materials were observed at this location.

A radiocarbon age of 6355 cal B.P.[1] was obtained from the Ab profile of the underlying Vaqueros paleosol, while an age of 1312 cal B.P. was obtained near the base of Deposit II-c, the overlying channel deposits. The age of the deposit indicates that a stable mid-Holocene land surface was cut by channel erosion, then buried by channel and floodplain aggradation during the late Holocene. The abandoned channel deposits may represent the previous course of the Kellogg Creek, or alternatively, a bypass channel that periodically handled overflow flooding of the main channel.

Buried archaeological materials were identified at two separate locations to the south (upstream) of Profile 1. A concentration of heat-altered rocks was found at a depth of about 1 m below the surface in a cutbank located about 30 m south of Profile 1. Farther upstream, an isolated pestle (cat. no. 95-12-44) was found at a depth of 270 cm below the surface in a cutbank located about 60 m south of Profile 1. The rock concentration was associated with the Brentwood deposit, while the pestle was associated with the Vaqueros deposit.

WESTERN ARM PROFILE (BORROW-PIT AREA)

Figure II.8 depicts the deposits exposed in a cutbank in the western arm of the valley, on the west side of Kellogg Creek approximately 1,067 m southwest of the proposed dam axis. The cutbank was selected because 400-cm exposure of alluvium was found in this location. The cutbank was cleared, documented, and sampled in the field as the Western Arm profile.

Three allostratigraphic deposits were recognized in the Western Arm profile (Figure II.8). Deposit I-f consisted of floodplain alluvium that exhibited a well-developed (Ab/Btb) soil profile representing a buried paleosol. Deposit IIc consisted of coarse angular gravel in a clay matrix (Cb) that appears to represent a colluvial debris-flow deposit. Deposit I-f consisted of floodplain alluvium that exhibited a well-developed (A/Bt/Btk/C) soil profile formed at or near the present surface. No archaeological materials were observed at this location.

A radiocarbon age of 11,180 cal B.P. was obtained from the buried paleosol (Deposit I-f) at a depth of 300 cm below the surface (Figure II.8). The age of the paleosol and the degree of soil development in the overlying deposit indicate that a Pleistocene land surface was probably buried during the late Pleistocene or early Holocene in the western arm of the valley. The alluvial sequence identified in the Western Arm is nearly twice as old as that identified in Profile 1, suggesting that the deposits in the main valley are significantly younger than those found in the smaller tributary valleys.

PROFILE 2 (CA-CCO-458/H)

Deposits exposed in a cutbank on the east side of Kellogg Creek approximately 457 m southwest of the proposed dam axis along the western edge of site CA-CCO-458/H (Figure II.9), were selected for study. The cutbank was selected because a 325-cm-thick sequence of alluvial deposits representing the processes of floodplain aggradation, channel cutting and filling, and floodplain stability was exposed at the location. The cutbank was cleared, documented, and sampled in the field as Profile 2.

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[1]Radiocarbon ages are presented here in calibrated years before present (cal. B.P.). The dates are formally presented and described in Chapter 8, Part IV.

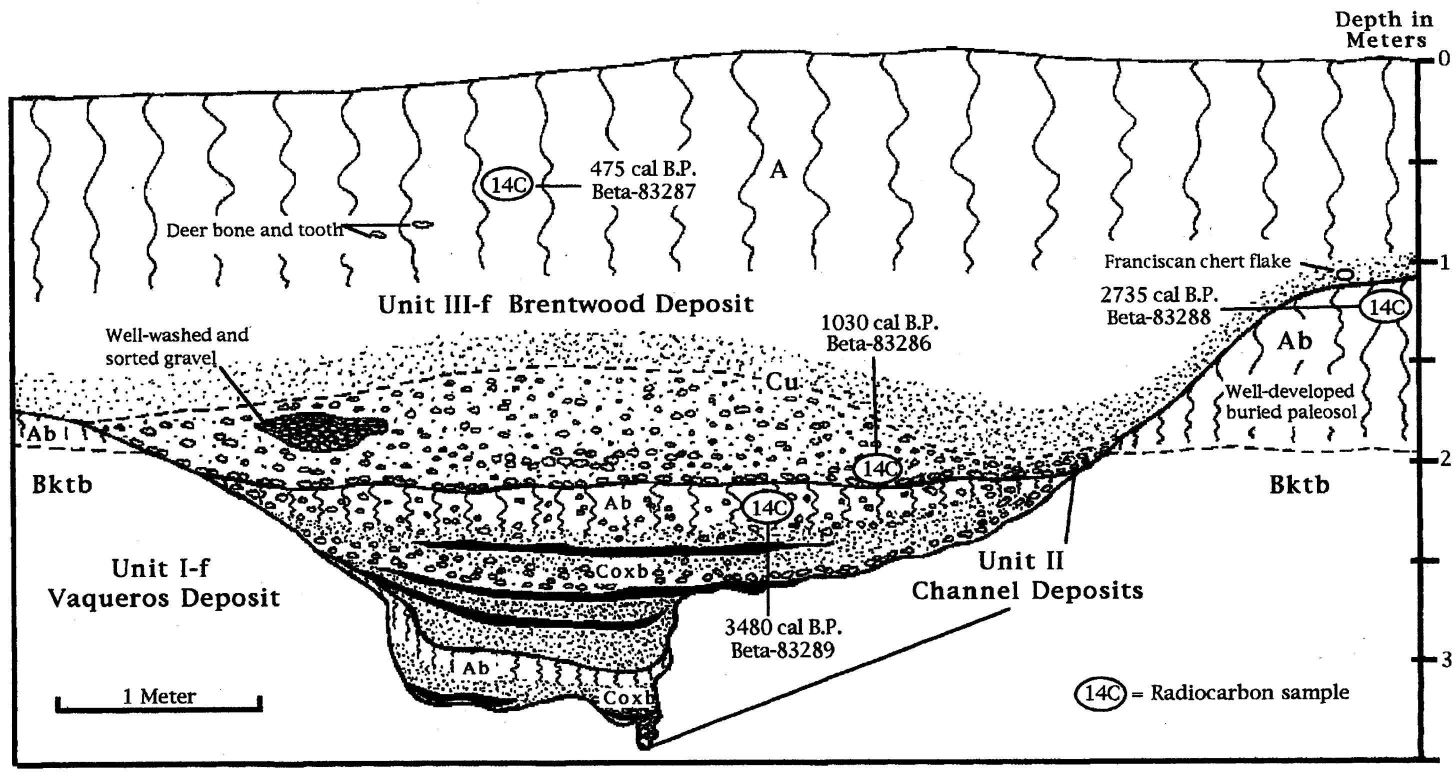

Figure II.9. Cutbank along Kellogg Creek Showing Profile 2 at CA-CCO-458.

Three allostratigraphic deposits were identified in Profile 2 as shown in Figure II.9. Deposit I-f consisted of floodplain alluvium that exhibited a well-developed (Ab/Bktb) soil profile representing the Vaqueros paleosol. A piece of culturally modified flaked stone was found in association with the upper portion of Deposit I-f at a depth of 100 cm below the surface. Deposit II consisted of alternating layers of sandy and gravelly clay representing a buried channel deposit. The upper portion of Deposit II exhibited a weakly developed (A/C) soil profile. Deposit III was composed of both channel and floodplain deposits. The lower portion consisted of poorly sorted gravel in a matrix of floodplain alluvium (Deposit IIIc). The upper portion consisted solely of fine-grained floodplain alluvium (Deposit III-f). The upper 75 cm of Deposit III-f contained pieces of dispersed charcoal and deer bone that were likely associated with the archaeological deposit at the site.

Radiocarbon analyses of four samples indicate that the sequence of alluvial deposits exposed in Profile 2 are Holocene in age. Despite apparent inconsistencies in the ages of certain charcoal and soil humate samples, a well-developed paleosol—dating to at least 3480 cal B.P.—was clearly buried by floodplain aggradation sometime between 1,100 and 500 years ago. Further, the buried channel in Profile 2 indicates that a portion of Kellogg Creek once followed a more easterly course and was abandoned more than 500 years ago.

DEBRIS-FLOW PROFILE (DIVERSION DAM AREA)

The Debris-Flow profile depicts the deposits exposed in a cutbank on the west side of Kellogg Creek, approximately 244 m southwest of the proposed dam axis (Figure II.10). The cutbank was selected because a 650-cm thick sequence of alluvial and colluvial deposits was exposed near the base of the hillslope. A small but persistent spring issued from fractured sandstone bedrock a short distance upslope from the profile. The cutbank was cleared, documented, and sampled in the field as the Debris-Flow profile.

Four allostratigraphic deposits were recognized in the Debris-Flow profile (Figure II.10). Deposit I-f consisted of floodplain alluvium that exhibited a well-developed (Btkb) soil profile representing a buried paleosol. The upper portion of Deposit I-f was truncated by erosion that removed the A horizon prior to burial. Deposit II-f consisted of floodplain alluvium that exhibited a well-developed (Ab/Bktb/Coxb) soil profile. Deposit III-f consisted of floodplain alluvium that exhibited a weakly developed (Ab/Cb) soil profile. Deposit IV consisted of colluvial deposits that exhibited a weakly developed (A/C) soil profile. The only archaeological material identified at this location was a basalt flake (95-12-43) recovered from Deposit IV.

In summary, the lower deposits represent three episodes of floodplain deposition, each followed by a period of floodplain stability. The uppermost deposit represents a single debris-flow event that originated as a colluvium-filled bedrock hollow a short distance upslope. The hollow was marked by a landslide scar that was a persistent spring source. Radiocarbon ages of three samples obtained from the profile indicate that each of the paleosols was buried during the Holocene.

PROFILE 5 (DAM FOOTPRINT)

Figure II.11 depicts the deposits exposed in the west bank of Kellogg Creek about 150 m southwest of the proposed dam axis and approximately 60 m northwest of site CA-CCO-696. The cutbank was selected because a 600-cm-thick sequence of alluvial deposits was exposed at the location. The deposits were exposed, documented, and sampled in the field as Profile 5.

Six allostratigraphic deposits were recognized at Profile 5 (Figure II.1). Deposit I consisted of channel and floodplain alluvium that exhibited a well-developed (Ab/Btkb) soil profile representing the Kellogg paleosol. Deposit II consisted of channel and floodplain alluvium that exhibited a well-developed (Bktb/Coxb) soil profile representing the Vaqueros paleosol. The upper portion of Deposit II was truncated by erosion that removed the A horizon prior to burial. Deposit III consisted of channel and floodplain alluvium that exhibited a weakly developed (Ab/Cub) soil profile formed by a

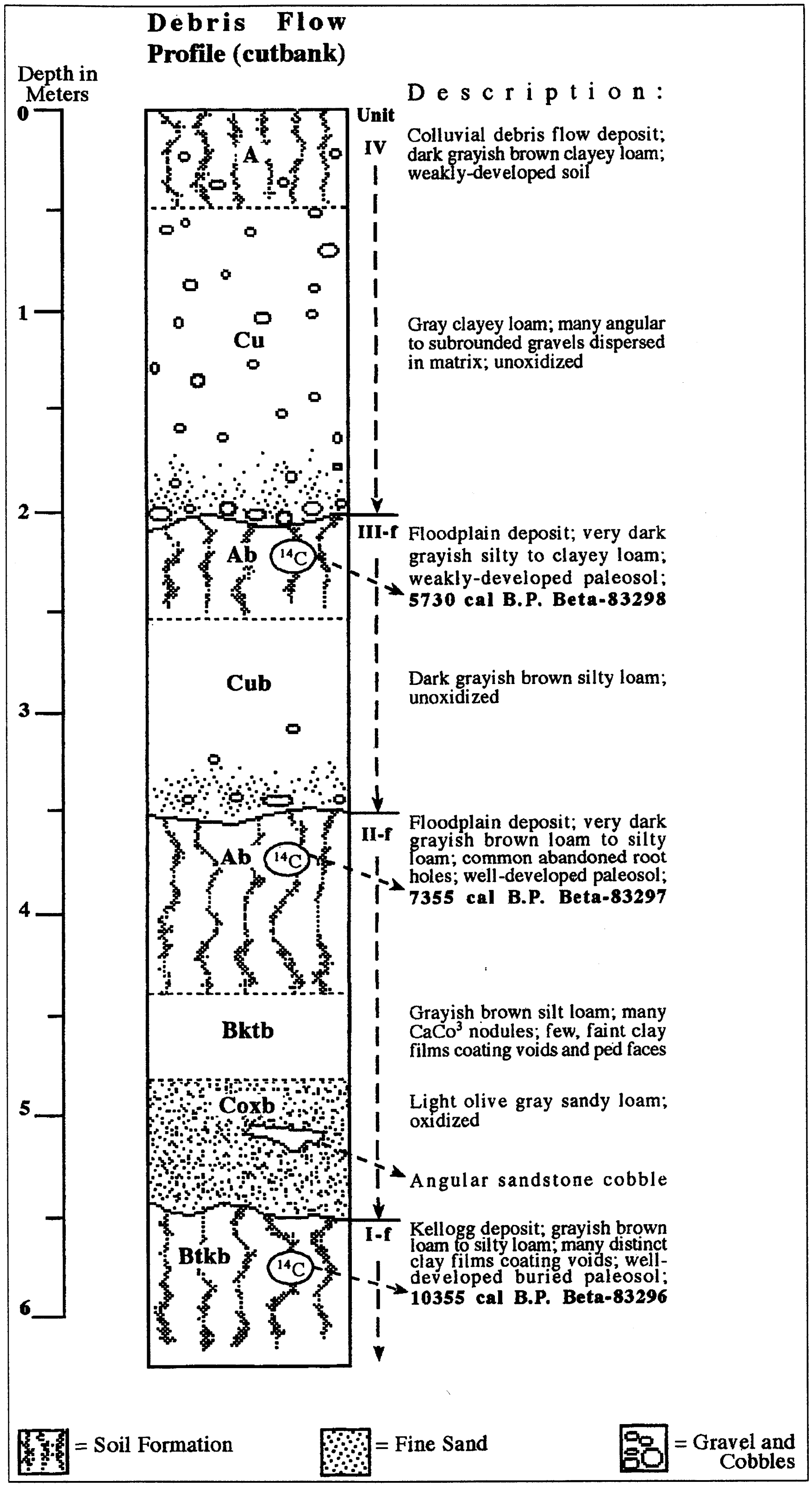

Figure II.10. Cutbank along Kellogg Creek Showing Debris-Flow Profile in Diversion-Dam Area.

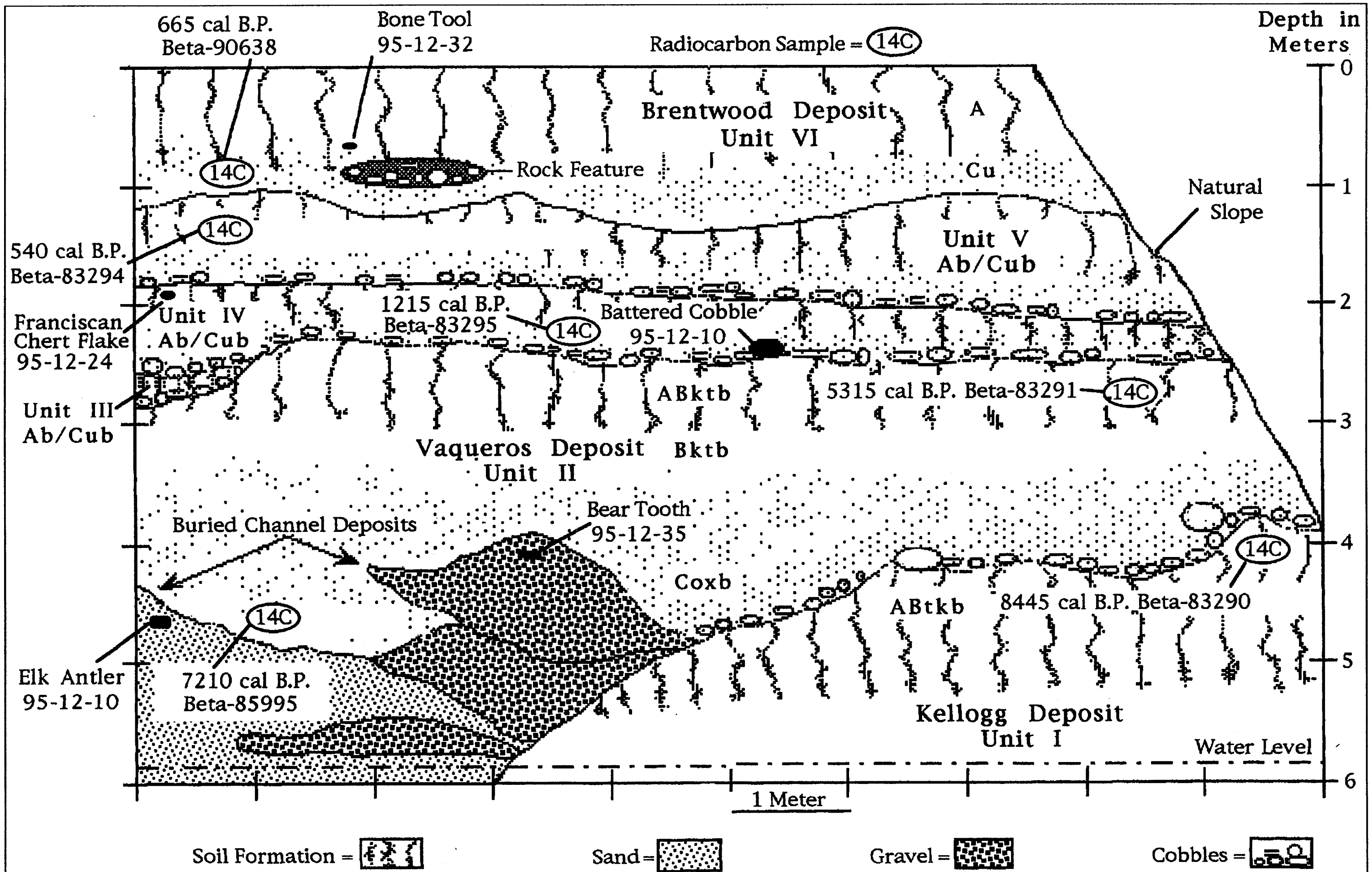

Figure II.11. Cutbank along Kellogg Creek Showing Profile 5 within the Dam Footprint

small channel cut into Deposit II. Deposit IV consisted of channel and floodplain alluvium that exhibited a weakly developed (Ab/Cub) soil profile. Deposit V consisted of channel and floodplain alluvium that exhibited a weakly developed (Ab/Cub) soil profile. Deposit VI consisted of floodplain alluvium that exhibited a weakly developed (A/Cu) soil profile representing the Brentwood deposit.

Buried archaeological materials and paleontological remains identified within Profile 5 included (1) a concentration of heat-altered rocks and a possible bone-tool fragment (95-12-32) at a depth of 95 cm, associated with the Brentwood deposit; (2) a red Franciscan chert flake (95-12-24) at a depth of 195 cm, associated with Deposit IV; (3) an extensively heat-altered and edge-battered cobble of gabbro (95-12-10) at a depth of 240 cm, associated with the truncated Vaqueros paleosol; and (4) a bear tooth (95-12-35) and a piece of an elk antler (95-12-6), associated with channel deposits near the base of the Vaqueros deposit.

Radiocarbon ages obtained from eight samples indicate that the alluvial sequence exposed in the profile is Holocene in age. Despite apparent inconsistencies in the ages of certain charcoal and soil humate samples, a series of paleosols were clearly buried by floodplain aggradation during the Holocene. In addition, the buried channel near the base of the profile indicates that this portion of Kellogg Creek once followed a more westerly course before it was abandoned sometime during the middle Holocene.

SUBSURFACE TESTING

A subsurface-testing program was conducted to evaluate the potential for buried archaeological resources in the reservoir area. Test trenches were excavated at about 100 locations to determine the presence, absence, and horizontal extent of buried paleosols, buried channels, and buried archaeological materials. Test-trench locations were selected based on the results of the cutbank survey, as well as on visible differences in the surface topography. The deposits in each trench were evaluated to determine the placement of subsequent test trenches. The occurrence of archaeological materials was determined by spot-checking the deposits as they were removed from test trenches and by examining trench cross sections whenever practical. The depth and general nature of the deposits were recorded in the field, with additional attention given to those deposits that contained buried paleosols or archaeological materials. Samples were collected from selected trenches for the purposes of laboratory description and radiocarbon analysis. The number, average dimensions, and total volume of excavated deposits from the test trenches are shown in Table II.2.

TABLE II.2
VOLUME EXCAVATED
FROM SUBSURFACE TEST TRENCHES

Construction Area	3 x 4 x .6 m	4 x 5 x .6 m	Cubic Meters
Diversion Canal	20	4	192.0
Borrow Pit	13	7	177.6
Diversion Dam	17	8	218.4
Dam Footprint	15	10	228.0
		Total =	816.0 m^3

Dimensions = Dm x Lm x Wm

DIVERSION CANAL

In order to divert the runoff carried by Kellogg Creek away from the borrow pit and dam areas, the contractor excavated a diversion canal across the floodplain (Figure II.6). Prior to construction, test trenches were excavated at 24 locations to evaluate the potential for buried archaeological materials along the diversion canal route. Six of these trenches were placed in the eastern part of the route, while the remaining 18 were placed in the western part, immediately east of Kellogg Creek.

Three allostratigraphic deposits were identified in the western area near Kellogg Creek. Deposit I-f consisted of floodplain alluvium that exhibited a well-developed (Ab/Btkb) soil profile, representing a paleosol buried nearly 4 m below the surface. Deposit II-f consisted of floodplain alluvium that exhibited moderately developed (Ab/Bktjb/Coxb) soil profile, representing a paleosol buried about 50 cm below the surface. A few pieces of heat-altered rock were found in association with Deposit II-f at some locations. Deposit III-f consisted of floodplain alluvium that exhibited a weakly developed (A/C) soil profile, representing a relatively brief period of weathering near the modern surface. Although the absolute age of the deposits is unknown, the lower deposit probably represents the Kellogg paleosol (early Holocene), the middle deposit probably represents the Vaqueros paleosol (middle to late Holocene), and the upper deposit probably represents the Brentwood deposit (late Holocene to present).

Two allostratigraphic deposits were identified in the eastern part of the canal route. Deposit I-f consisted of floodplain alluvium that exhibited a well-developed (ABtkb) soil profile that represents a Pleistocene-age paleosol. Deposit II-f consisted of floodplain alluvium that exhibited a thick but only moderately developed (A/Bk/Bky/Cox) soil profile. The deposit appears to have been formed by the near-surface weathering of sediments that accumulated slowly but steadily in a poorly drained basin during the late Pleistocene and Holocene. Shrinking and swelling of the expansive clays in the deposit has disrupted the progressive formation of distinct soil horizons.

Subsurface testing confirmed that the western part of the diversion-canal route contained a buried Holocene paleosol. It also determined that the eastern part of the diversion-canal route did not contain a paleosol buried during the Holocene. No evidence of human remains or significant archaeological deposits was encountered along the Diversion Canal route during test excavations.

BORROW-PIT AREA

In order to obtain earthen fill materials during construction, a borrow pit was proposed for a large area of the Kellogg Creek floodplain (Figure II.6). Prior to construction, 20 test trenches were excavated to evaluate the potential for buried archaeological materials in the proposed area. Seventeen of these trenches were placed in or near the defined area to the east of Kellogg Creek, while the remaining 3 trenches were placed in an alternate location to the west of the creek. The number, average dimensions, and total volume of excavated deposits from the test trenches are shown in Table II.1.

Three allostratigraphic deposits were identified in the central part of the borrow-pit area. Deposit I-f consisted of floodplain alluvium that exhibited a well-developed (Ab/Bktb) soil profile representing the Vaqueros paleosol. A few pieces of heat-altered rock were associated with Deposit I-f in some trenches. Upper portions of Deposit I-f were truncated by stream erosion along the course of former channels. Deposit II-c consisted of highly variable deposits of sand and gravel that represented an abandoned stream channel. A radiocarbon age of 1875 cal B.P. was obtained from the upper portion of Deposit II-c in the Live Oak trench (Figure II.12). Isolated mammal bone fragments (95-12-27, -28, -29) were found to occur at various locations within Deposit II-c. Deposit III-f consisted of floodplain alluvium that exhibited a weakly developed (A/Cu) soil profile, representing the Brentwood deposit. One edge-modified obsidian flake (95-12-31) was recovered from Deposit III-f.

Thick deposits of clay-rich alluvium were found along the eastern and western margins of the valley where the Brentwood and Vaqueros deposits were notably absent. Two allostratigraphic deposits were identified in the eastern and western parts of the valley. The lower deposit consisted of floodplain alluvium that exhibited a well-developed (ABtkb) soil profile that probably represents a Pleistocene-age

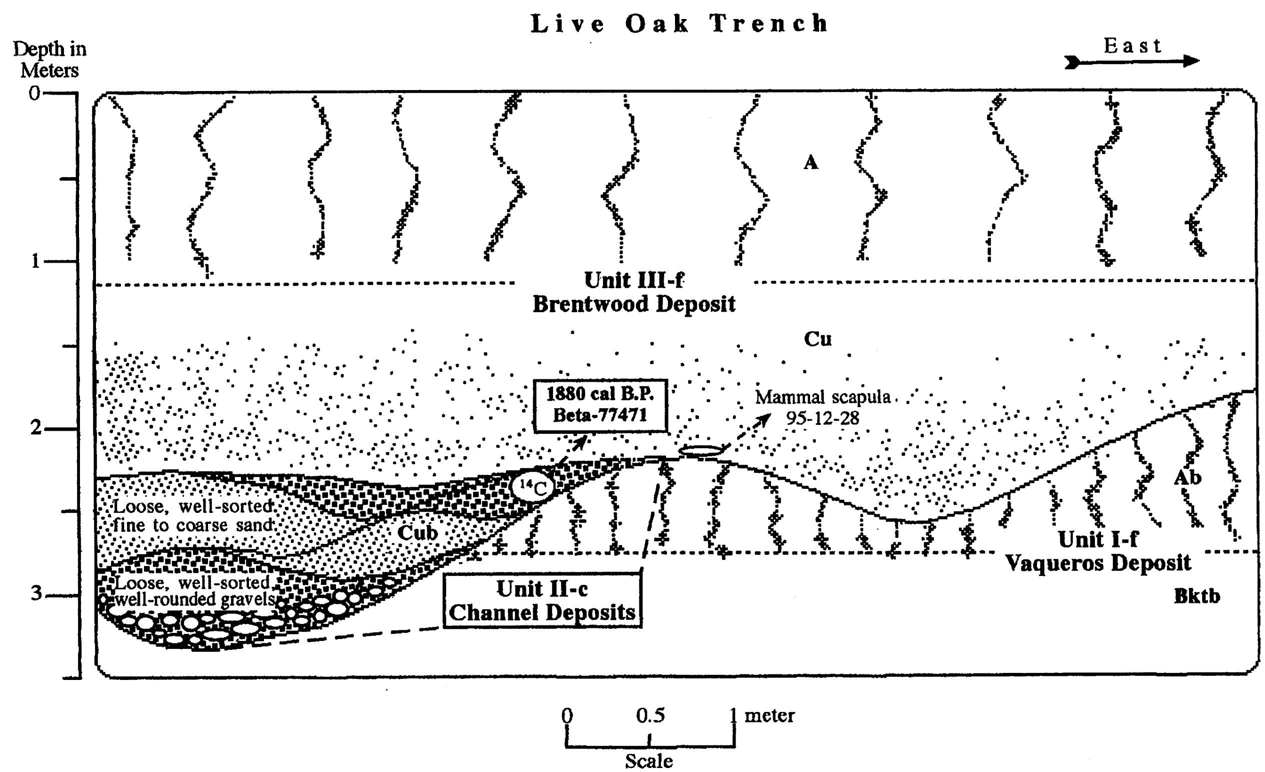

Figure II.12. Profile of Live Oak Trench Excavated across the Eastern Buried Channel in the Borrow-Pit Area.

paleosol. The upper deposit consisted of floodplain alluvium that exhibited a thick but only moderately developed (A/Bk/Bky/Cox) soil profile. The deposit appears to have been formed by the near-surface weathering of sediments that accumulated slowly but steadily in a poorly drained basin during the late Pleistocene and early Holocene. Shrinking and swelling of the expansive clays in the deposit has disrupted the progressive formation of distinct soil horizons.

Subsurface testing confirmed the occurrence of a former Holocene stream channel and buried paleosol in the western part of the borrow pit area. It was also determined that the eastern borrow area and alternative borrow area west of Kellogg Creek did not contain a paleosol buried during the Holocene. No significant concentrations of archaeological materials were encountered in the borrow area during the test excavations.

DIVERSION DAM

A diversion dam was proposed to keep runoff from the Kellogg Creek valley from reaching the dam excavation area (Figure II.6). In order to evaluate the potential for buried archaeological materials, 25 test trenches were excavated in the proposed diversion dam area. All of these trenches were placed to the east of Kellogg Creek and west of a gas-pipeline route located on the east side of the valley. The number, average dimensions, and total volume of excavated deposits from the test trenches are shown in Table II.1.

Three allostratigraphic deposits were identified in the western part of the diversion-dam area during test excavations. Deposit I-f consisted of floodplain alluvium that exhibited a well-developed (Ab/Bktb) soil horizon, representing the Vaqueros paleosol. A significant concentration of buried archaeological materials, including flaked stone, heat-altered rocks, intact human burials, and burnt faunal bone were discovered in association with the Vaqueros paleosol (Deposit I-f) at a depth of 60 to 120 cm (Trench 12-2-2). Upper portions of Deposit I-f were truncated by stream erosion along the course of former channels. Deposit II-c consisted of highly variable channel and floodplain deposits that exhibited a moderately developed (Ab/Bkb/Cub) soil profile, representing abandoned stream channel and terrace deposits. Deposit III-f consisted of floodplain alluvium that exhibited a weakly developed (A/Cu) soil profile representing the Brentwood deposit.

A single allostratigraphic deposit was identified in the eastern part of the diversion dam area. The deposit consisted of a thick deposit of clay-rich floodplain alluvium that exhibited a thick but only moderately developed (A/Bk/Bky/Cox) soil profile. The deposit appears to have been formed by the near-surface weathering of sediments that accumulated slowly but steadily in a poorly drained basin during the late Pleistocene and Holocene. Shrinking and swelling of the expansive clays in the deposit has disrupted the progressive formation of distinct soil horizons.

Subsurface testing confirmed that a former Holocene stream channel and buried paleosol occur in the western part of the diversion dam area. It was determined that the eastern part of the diversion-dam area did not contain a paleosol buried during the Holocene. In addition, the concentration of archaeological materials associated with the buried Vaqueros paleosol was recorded as a prehistoric site, and later assigned the trinomial CA-CCO-696 (P-07-000019) by the Northwest Information Center of the California Historical Resources Information System.

DAM FOOTPRINT AREA

Construction of the Los Vaqueros Dam required that all of the deposits within the dam footprint be removed to the depth of unweathered bedrock. In order to evaluate the potential for buried archaeological materials in this location, 25 test trenches were excavated in the valley segment of the dam footprint (Figure II.6, Table II.2). The majority of these trenches were placed in the area between Kellogg Creek and the gas-pipeline route. A single trench was placed in a small floodplain segment located west of the creek.

Four allostratigraphic deposits were identified in the western part of the dam area during test excavations. Deposit I-f consisted of floodplain alluvium that exhibited a well-developed (Ab/Bktb) soil profile representing the Kellogg paleosol. Deposit II-f consisted of floodplain alluvium that exhibited a well-developed (Ab/Bktb) soil profile representing the Vaqueros paleosol. A few pieces of heat-altered rock were associated with Deposit I-f in some trenches. Upper portions of Deposit II-f were truncated by downcutting along the course of former channels. Deposit II-c consisted of highly variable channel and floodplain deposits that exhibited a moderately developed (Ab/Bkb/Cub) soil profile, representing abandoned stream channel and terrace deposits. Deposit III-f consisted of floodplain alluvium that exhibited a weakly developed (A/Cu) soil profile representing the Brentwood deposit.

A single allostratigraphic deposit was identified in the eastern part of the dam footprint area during test excavations. The deposit consisted of a thick deposit of clay-rich floodplain alluvium that exhibited a thick but only moderately developed (A/Bk/Bky/Cox) soil profile. The deposit appears to have been formed by the near-surface weathering of sediments that accumulated slowly but steadily in a poorly drained basin during the late Pleistocene and Holocene. Shrinking and swelling of the expansive clays in the deposit has disrupted the progressive formation of distinct soil horizons.

Subsurface testing confirmed that a former Holocene stream channel and two buried Holocene paleosols occur in the western part of the dam footprint area. Trenching in the dam area revealed that the Brentwood deposit caps a peninsular remnant of the Vaqueros deposit, buried about 60 to 150 cm below the present-day ground surface. The peninsula narrowed to the north where it eventually terminated at a point near the central axis of the dam.

It was also determined that the eastern part of the dam area did not contain a paleosol buried during the Holocene. No evidence of human remains or significant archaeological deposits were encountered in the dam footprint area during test excavations.

SUBSURFACE SURVEY CONCLUSIONS

On the basis of these findings, it was possible to determine the potential for buried archaeological sites in various parts of the reservoir area. The western part of the diversion canal, borrow pit, diversion dam, and dam footprint areas was found to have a moderate to high potential for containing buried archaeological materials. By contrast, the eastern part of these areas, and the alternative borrow area, was found to lack potential or have a low potential for containing buried archaeological materials.

Due to the high potential for buried archaeological materials in the central part of the valley, it was proposed that excavations in the area be restricted to avoid the inadvertent destruction of archaeological resources. After consultation with engineers and CCWD officials, an archaeological Exclusion Zone was established throughout the central part of the valley. It was agreed that the Exclusion Zone could be capped with earth materials, but that archaeological monitoring would be required where excavations could not be relocated. As a result, a large portion of the original borrow pit was abandoned in favor of the less-sensitive alternate area on the west side of the valley. The Exclusion Zone was marked as a closed polygon in the field to inform project personnel of the area's sensitivity.

CHRONOSTRATIGRAPHIC UNITS

The late Quaternary deposits identified in the upper Kellogg Creek valley were divided into informal allostratigraphic units to simplify correlations within and between units from different areas. Each unit was distinguished on the basis of laterally traceable discontinuities (erosional surfaces or buried paleosols) as defined by the North American Commission on Stratigraphic Nomenclature (1983:865-867). The chronostratigraphic sequence of these units was established using both relative (stratigraphic superposition, soil development, temporally diagnostic artifacts) and absolute (radiocarbon determinations) age indicators. The major units include the (1) Pleistocene, (2) Rincon, (3) Kellogg, (4) Vaqueros, and (5) Brentwood deposits, while the minor units consist of a series of highly variable

channel deposits. The nature and extent of these units are identified to define the landform contexts and to bracket the temporal range of human occupation in the reservoir area.

PLEISTOCENE UNIT

This unit was represented by a moderately to well-developed soil formed in alluvial deposits. The unit is exposed at the surface of several deeply incised alluvial fan deposits at the southern end of the valley. These fans are covered with many well-rounded cobbles and gravel composed of basalt, chert, dacite, granite, and quartzite that represent lag deposits. The unit is not exposed at the surface in the northern end of the reservoir area, where it is overlain by about 3 to 4 m of alluvium around the edges of the valley (Western Arm cutbank and CCO-637), and by more than 7 m of alluvium near the center of the valley (CCO-696 and dam area). Partly mineralized mammal remains were recovered from the unit at CCO-637 and within the dam area near Profile 5 (see Appendix B).

The unit underlies the Rincon unit around the edges of the valley, and the Kellogg unit near the center of the valley. The Pleistocene unit is more than 10,875 cal B.P. according to the oldest 2-sigma cal B.P. age obtained from the overlying Kellogg unit. Radiocarbon ages of 9990 +/- 70 B.P. (11,182 cal B.P.) and 13,180 +/- 150 B.P. (Beta-90635, soil humate) or 15,710 cal B.P. were obtained from the unit's paleosol at the Western Arm and CA-CCO-696 respectively. These dates range from 16,175 to 11,000 cal B.P. at 2 sigma, confirming that the upper portion of the unit is Pleistocene in age (Figure II.13).

Although the Pleistocene paleosol was available for about 4,500 years of human occupation during the Paleoindian period, no archaeological materials were found within any portion of the unit. This investigation, however, was able to sample the unit at only a couple of locations due to its considerable depth below surface.

RINCON UNIT

This unit was represented by clay-rich alluvial deposits that tend to be associated with alluvial fans and overflow basins occurring at or near the surface around the valley margins. The accumulation and shrink and swell of expansive clays within the unit have disrupted progressive soil formation, resulting in a profile with only moderate development. No paleosols or other discontinuities were identified within the unit.

The unit overlies the Pleistocene unit around the edges of the valley and may be interfingered with the Kellogg unit near the center of the valley. The unit underlies the Brentwood unit at depths of 10 to 60 cm in a few areas. The Rincon unit is less than 11000 cal B.P. according to the youngest 2-sigma cal B.P. date obtained from the underlying Pleistocene unit (Figure II.13). Although not directly dated, the chronostratigraphic position of the Rincon unit indicates that it is probably Early Holocene and not Pleistocene in age, as suggested by Helley et al. (1979).

No archaeological materials were found within any portion of the Rincon unit. While the lack of archaeological materials may be the result of inadequate sampling, it may alternatively reflect a human preference for landforms that were more stable for occupation than those associated with the Rincon unit. It is also likely that intense argilliturbation within the unit's matrix has largely disturbed and/or destroyed the systemic context of any associated archaeological materials.

KELLOGG UNIT

This unit was represented by a well-developed soil formed in alluvial deposits near the center of the valley. The unit was not exposed at the surface in the northern end of the reservoir area, where it was overlain by 3 m or more of alluvium (CCO-696, Profile 5, and Debris-Flow cutbank). Although the relationship remains uncertain, the unit may correlate with some surface deposits exposed at the southern end of the valley. The unit contained intact concentrations of buried archaeological materials in the North and South loci of CCO-696.

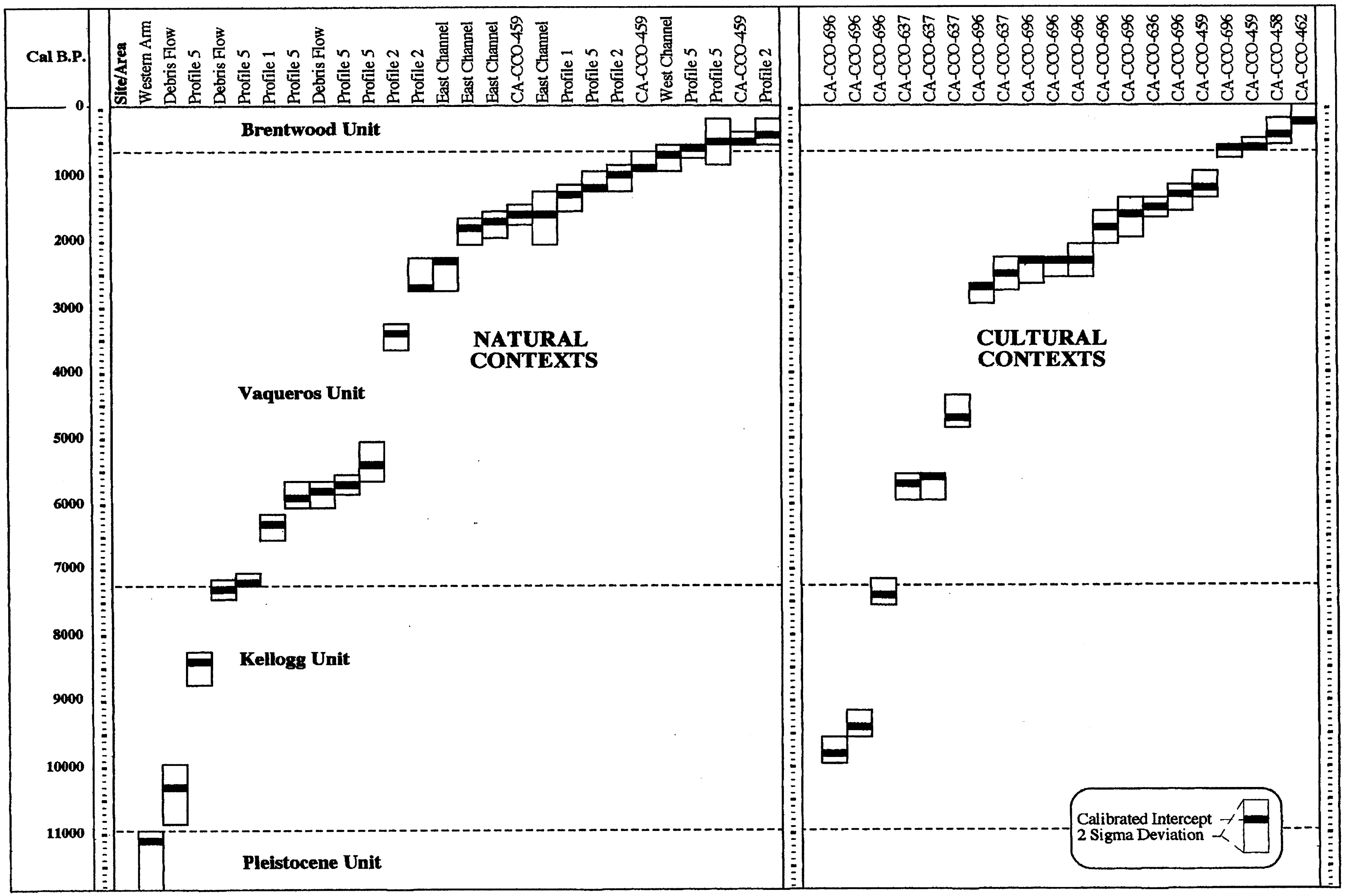

Figure II.13. Radiocarbon Dates from Natural and Cultural Contexts in the Reservoir Area Showing Chronostratigraphic Unit Divisions. (Natural date of 15,710 cal B.P. from CA-CCO-696 not included.)

Near the center of the valley, the unit overlies the Pleistocene unit at depths of more than 7 m, and underlies the Vaqueros unit at depths of about 3.2 m. The unit is less than 11,000 cal B.P. according to the youngest 2-sigma cal date obtained from the underlying Pleistocene unit. The unit is more than 6500 B.P. according to the oldest 2-sigma cal date obtained from the paleosol of the overlying Vaqueros unit. Five radiocarbon dates were obtained from the unit, 2 from natural contexts and 3 from cultural contexts. The oldest date (10,355 cal B.P.) was obtained from the paleosol formed in the unit at the Debris Flow cutbank, while the youngest date (7400 cal B.P.) was obtained from Burial 160 in the North locus of CCO-696. The combined 2-sigma range of these dates (10,875 to 7255 cal B.P.) indicates that the Kellogg unit is early Holocene in age (Figure II.13).

The paleosol associated with Kellogg unit was available for human occupation for as much as 4,000 years during the late Paleoindian and lower Archaic period. A variety of buried archaeological materials were associated with the Kellogg paleosol, including milling equipment and one isolated human burial. The cultural radiocarbon dates indicate that the paleosol was occupied, at least intermittently, for a span of about 2,500 years, from 9870 to 7400 B.P.

VAQUEROS UNIT

This unit was represented by a well-developed soil formed in alluvial deposits near the center of the valley. The unit was not exposed at the surface in the northern end of the reservoir area, where it was overlain by 40 cm or more of alluvium (CCO-458, CCO-696, and the dam area). Although the relationship remains uncertain, the unit may correlate with some surface deposits exposed at the southern end of the valley. The unit contained intact concentrations of buried archaeological materials in the East and West loci of CCO-458 and in the North and South loci of CCO-696.

Near the center of the valley, the unit overlies the Kellogg unit at depths of about 320-cm, and underlies the Brentwood unit at depths of 40 cm or more. The unit is generally less than 7255 cal B.P. according to the youngest 2-sigma cal date obtained from Burial 160 in the underlying Kellogg unit. The unit is generally more than 650 cal B.P. according to the oldest 2-sigma cal date obtained from the overlying Brentwood unit. Sixteen radiocarbon dates were obtained from the unit, 6 from natural contexts, and 10 from cultural contexts. The oldest date (7210 cal B.P.) was obtained from the unit's channel facies at Profile 5, while the youngest date (690 cal B.P.) was obtained from Burial 157 in the North Locus of CCO-696. Dates from the paleosol (floodplain facies) formed in the unit range from 6355 cal B.P. (Profile 1) to 2735 cal B.P. (Profile 2). The combined 2-sigma range of these dates (7280 to 660 cal B.P.) indicates that the age of the Vaqueros unit spans all of the middle Holocene and most of the late Holocene (Figure II.13).

The paleosol associated with the Vaqueros unit was available for human occupation for as much as 6,000 years during the lower, middle, and upper Archaic and the Emergent periods. An extensive variety of buried archaeological materials were associated with the Vaqueros paleosol, including many artifacts and human burials. The cultural radiocarbon dates indicate that the paleosol was occupied, at least intermittently, for a span of more than 2,000 years, from 2735 to 690 B.P.

BRENTWOOD UNIT

This unit was represented by a weakly to moderately developed soil formed in alluvial deposits throughout the center of the valley. The unit was generally associated with the most recent floodplains exposed at the ground surface. The unit contained concentrations of archaeological materials at or near the surface at CCO-468 and in the West locus of CCO-458.

The unit overlies the Vaqueros unit at depths of 40 cm or more throughout the center of the valley. The unit's floodplain is generally less than 660 B.P,. according to the youngest 2-sigma calibrated age obtained from Burial 157 in the underlying Vaqueros unit. The unit is generally more than 300 B.P. according to a count of tree-rings from a large oak that was rooted through the unit at CCO-458. Six radiocarbon dates were directly associated with the unit, four from natural contexts and two from cultural contexts. The oldest date (780 cal B.P.) was obtained from the unit's channel facies in Exposure

5 at CCO-696, while the youngest date (250 cal B.P.) was obtained from Feature 1 at CCO-468. Dates from the unit's floodplain facies include the 250 cal B.P. date from Feature 1 at CCO-468, a date of 475 cal B.P. at Profile 2, and dates of 540 and 665 cal B.P. at Profile 5. The combined 2-sigma range of these dates (from 955 to 225 cal B.P.) indicates that the Brentwood unit is late Holocene to Historic in age (Figure II.13).

The Brentwood unit was available for human occupation for about 600 years during the Emergent and Historic periods. A variety of archaeological materials were associated with the Brentwood soil, including many artifacts and at least three human burials. The cultural radiocarbon dates indicate that the unit was occupied for at least 200 years, from about 465 to 250 B.P.

MINOR UNITS (CHANNEL DEPOSITS)

These units were represented by highly variable alluvial deposits that record a series of cutting and filling episodes within formerly active stream channels. These units were not exposed at the surface, but occur at depths of 1.5 to 7.5 m below the surface in the central part of the valley. The West Channel is a discontinuous feature of the landscape, while the East Channel represents a semi-continuous landscape feature in the northern part of the reservoir area (Figure II.14). These units contained a few buried archaeological materials that were redeposited within the channels.

Within the West Channel, these units were inset over and against the Kellogg and Vaqueros units at depths of 1.5 to 3 m, while in the East Channel, they were inset over and against the Pleistocene, Kellogg, and Vaqueros units at depths of 1.5 to 7.5 m near CCO-696. The units formed a complex sequence that was vertically and horizontally interfingered in many areas. In most cases, the units are overlain by the Brentwood unit at depths of about 1.5 m. Ten radiocarbon dates were obtained from these units—5 from the East Channel, 3 from the West Channel, and 2 from the channels within the Vaqueros unit. Dates from the channel deposits range from 7210 cal B.P. (Profile 5) to 780 cal B.P. (Exposure 5 at CCO-696). Six of the dates are clustered between 2000 and 1000 cal B.P. The combined 2-sigma range of these dates (7280 to 670 cal B.P.) indicates that the age of the channel deposits spans the middle and late Holocene (Figure II.14).

While the channels represent relatively persistent features that were available for human use throughout most of the Holocene, they were periodically unavailable due to unstable landform processes. Consequently, redeposition in the active channels has removed and redistributed archaeological materials that were contained in the channels.

SUMMARY

The upper Kellogg Creek valley contains an alluvial chronostratigraphic sequence that spans the past 15,000 years or more. The sequence consists of 5 major units, defined on the basis of distinct vertical and horizontal discontinuities as marked by erosional surfaces and buried paleosols. Three of these units (Pleistocene, Kellogg, and Vaqueros) were buried, while the remaining units (Rincon and Brentwood) were exposed at the surface within the northern part of the reservoir area. The younger units were generally found within the central part of the valley, while the older units were generally located along the edges of the valley (Figure II.15).

The age, nature, and extent of the chronostratigraphic units provide a basis for defining the context and temporal range of human occupation and site formation. Well-developed paleosols were found in association with the Pleistocene, Kellogg, and Vaqueros units. Given that the paleosols formed during periods of landscape stability lasting 4,000 years or more, it was expected that archaeological materials from different time intervals or cultural groups would be coassociated within the paleosols. The occurrence of buried archaeological materials in the early Holocene (Kellogg) and middle to late Holocene (Vaqueros) paleosols confirmed that they were occupied by prehistoric people. The apparent absence of archaeological materials around the margin of the valley may be explained in part by the absence of Holocene age paleosols in these areas.

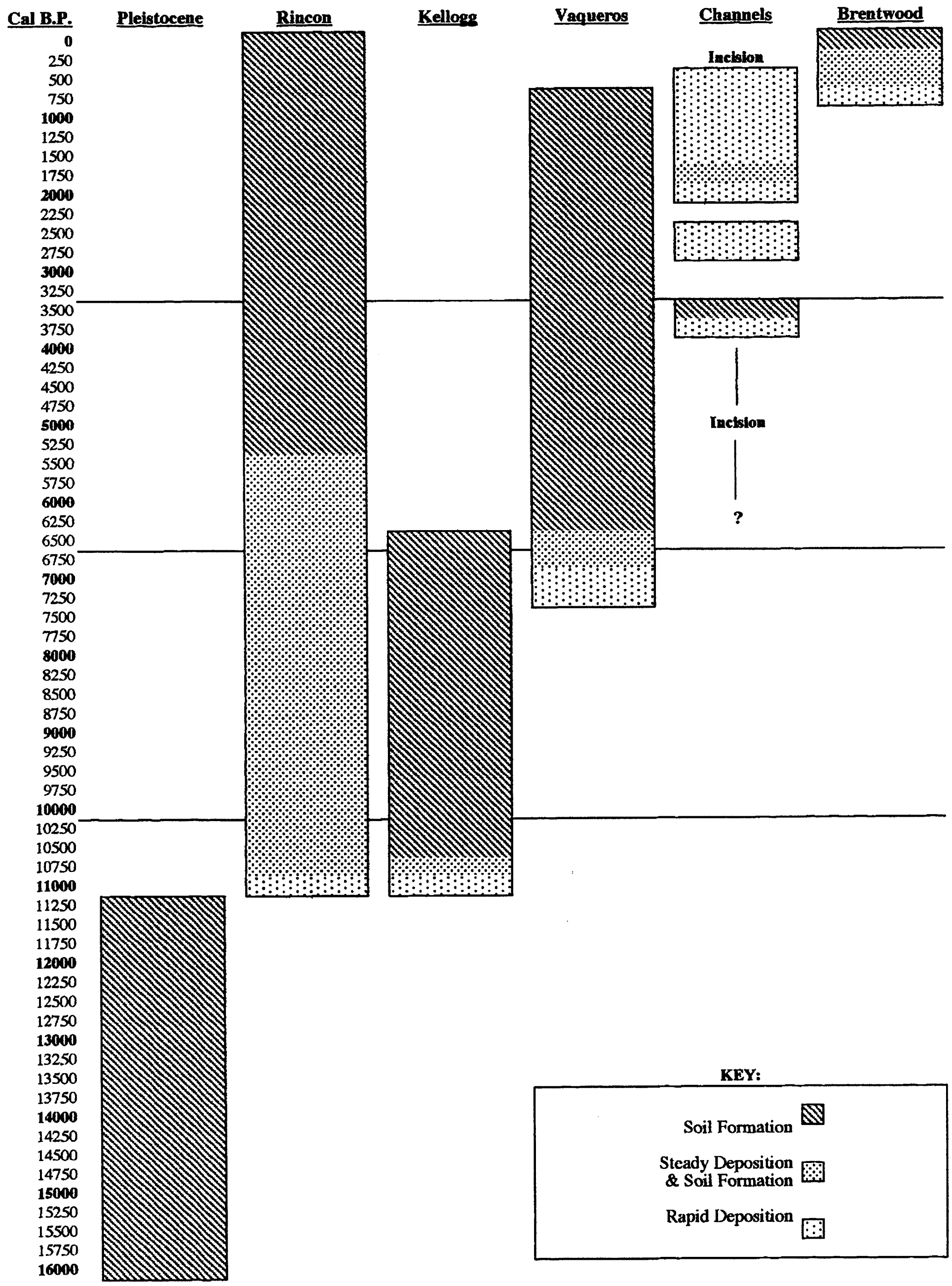

Figure II.14. The Timing of Dominant Landform Processes Responsible for the Formation of the Chronostratigraphic Units

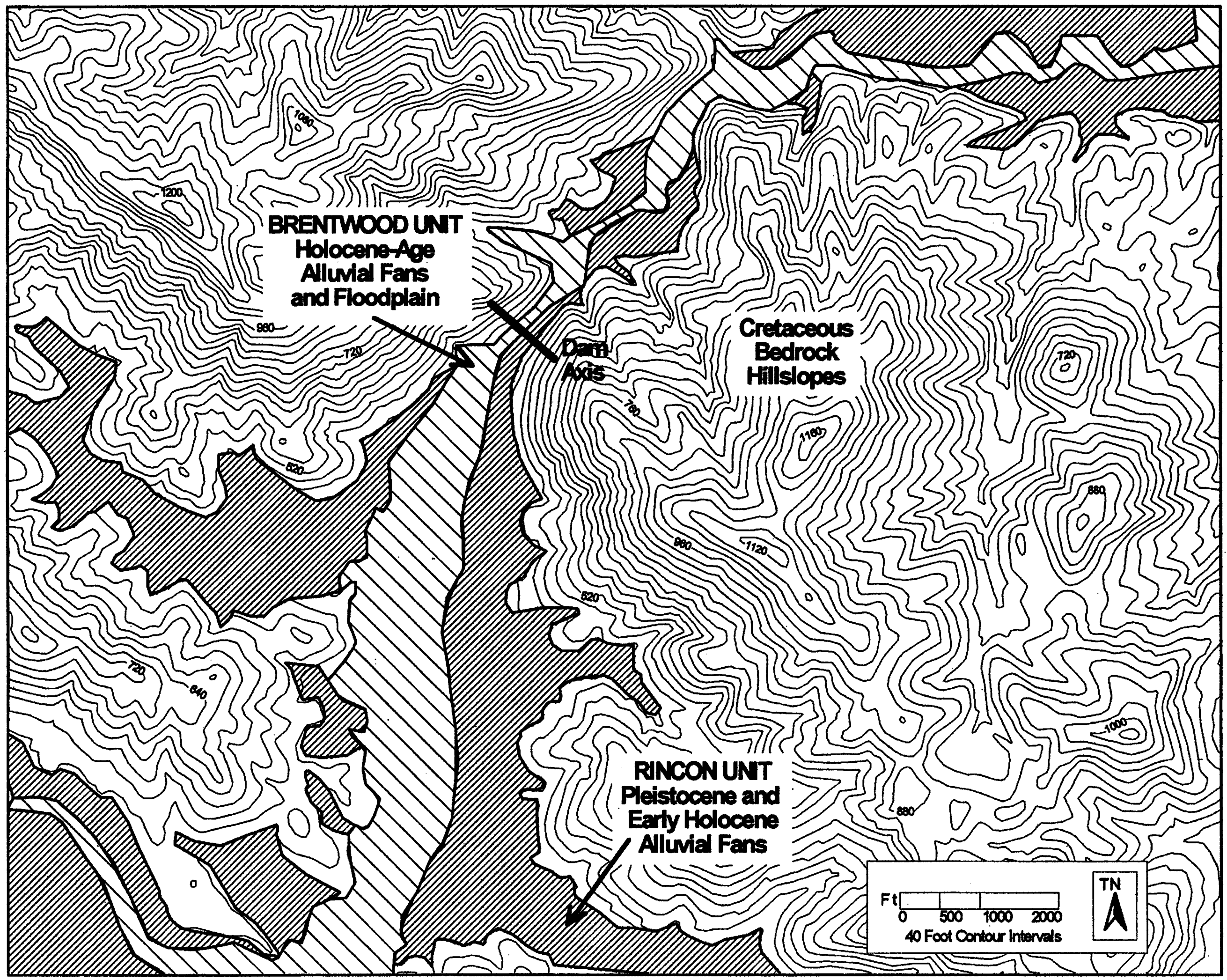

Figure II.15. Distribution of Surface Chronostratigraphic Units in Kellogg Creek Valley, Los Vaqueros Project

The occurrence of redeposited archaeological materials in two former channels indicates that active watercourses had been present during the prehistoric human occupation of the valley. Archaeological materials were also found in the Brentwood unit, at or near the surface of the most recent floodplain. Although no archaeological materials were found in the Pleistocene or Rincon units, because of their depth and the lack of impacts these units were not adequately sampled. Nevertheless, the lack of materials in these unit may suggest that the valley was not occupied by people at this time, or alternatively, that other portions of the landscape were preferred for human use and occupation during these chronostratigraphic intervals.

CHAPTER 5
FIELD AND LABORATORY METHODS AND TECHNIQUES

GOALS OF FIELD INVESTIGATION

The field investigations targeted both natural and archaeological deposits in an effort to locate and sample a variety of discrete contexts, each with different interpretive potentials. Sampling efforts were organized to achieve the research goals while attempting to maximize the labor investment. The field strategy was guided by the recognition that the relationship between landforms and archaeological sites in the project area represents a combination of natural and cultural processes.

These investigations attempted to isolate individual cultural components on the basis of spatially and temporally discrete occupations. Since it is known that soil-formation processes often disturb the systemic context of individual archaeological materials, discrete archaeological features were chosen for sampling to increase the possibility that individual occupations and cultural components might be identified. Given the presence of multiple land surfaces buried within the Kellogg Creek floodplain, determining the vertical and horizontal extent of archaeological materials at each site was a complex process. Horizontal sampling was designed to distinguish discrete occupations within a single geological deposit, while vertical sampling was used to identify differing cultural components associated with separate geological deposits.

FIELD METHODS

Different field approaches were used depending on the existing conditions at each site. Both hand-excavation and backhoe-trenching were used within a variety of excavation unit sizes and types and employing several kinds of screening strategies. The two basic excavation methods used are described below; because human burials were exposed and removed only by hand, their recording and removal is described under hand excavation. The different screening techniques and the reasons for their use are identified and described, as are the four kinds of units excavated. Site-specific investigation strategies are detailed by site in Part III. A volumetric summary of the excavated material from all field phases is provided as Appendix A.

BACKHOE-TRENCHING

Test trenches were excavated at all but one (CA-CCO-468) of the archaeological sites, and at 80 other locations within the reservoir inundation pool. The amount of trenching at any one location was constrained to various degrees by safety and management considerations, as well as by the nature and/or extent of the deposit.

As the initial step in site investigation, mechanically excavated exposures served four purposes: (1) to determine the horizontal and vertical extent of each archaeological deposit identified on the modern surface; (2) to identify buried paleosols and natural stratigraphic boundaries; (3) to locate possible buried archaeological deposits; and (4) to evaluate site-formation processes. Specific locations were targeted to determine the presence or absence of buried archaeological materials and to establish the stratigraphic relationship of alluvial landforms in the dam area. Information obtained from trench profiles was used to develop appropriate data-recovery strategies and to make decisions about further labor investment at each site.

Trenches were excavated using a tractor-mounted backhoe. All trenching was monitored by the project geoarchaeologist, and trench spoils were raked and periodically spot-screened. The occurrence of archaeological materials was identified by checking the deposits as they were removed from test trenches and by examining trench cross sections whenever practical. Trench profiles that contained buried paleosols or archaeological materials were drawn and described in the field. Soil and sediment

samples were collected, bagged, and labeled by the project geoarchaeologist from representative exposures. The dimensions of the trenches ranged from 4.5 to 7.5 m (15 to 24.5 ft.) in length; from 2 to 4.5 m (6.5 to 15 ft.) in depth; and at least .6 m (2 ft.) in width.

HAND-EXCAVATION METHODS

Unit Excavation

All hand-excavated units were delineated in the field from the primary datum corner. Units were excavated by teams, each composed of an excavator and one or more screeners. Hand-excavation was accomplished using mattocks, shovels, and trowels. Cultural materials recovered during wet and dry screening were collected, recorded on level records, and placed in bags labeled with the site and unit designation, depth, date, contents, and the excavators' and screeners' initials.

When subsurface features were encountered, they were exposed, mapped in plan view, photographed, and where appropriate, cut in cross section and drawn in profile. All features were recorded with reference to a primary or secondary datum, assigned a feature number, and described on a feature record. Radiocarbon and/or flotation samples were taken; then the remaining feature matrix was screened and cultural materials collected, bagged, and noted on the feature record.

Human Burials

All human burials encountered were carefully exposed using trowels, dental picks, brushes, and other small hand tools. Each burial was assigned a number; the location was recorded with reference to a primary or secondary datum, and a plan map of the exposed remains was created. The position and orientation of the body and other relevant information were recorded on a field form, and the burial photographed. All skeletal remains and associated artifacts were removed, bagged, labeled, and placed in a new archive box. At the end of each field day, an archaeologist and Native American consultant transported the human remains to a secure storage facility located in the yard of the CCWD field office.

Flotation Samples

Flotation samples were collected from features, sidewalls, and columns. Column samples were 0.5 x 0.5 m or 0.25 x 0.25 m in size and excavated in arbitrary 10-cm levels below a unit or primary datum. Column samples were collected from sites CA-CCO-458/H, -459, and -696. These samples functioned as both contexts for retrieving archaeobotanical remains and as a method of obtaining samples of fine-grained constituents. Column and sidewall samples were collected with reference to the archaeological excavation grid and natural or cultural strata. Due to the stratigraphic and associational integrity of features, the majority of flotation samples were collected from these contexts. Flotation samples were placed in double-walled plastic bags, labeled, and taken to the ASC Collections Facility for processing. Details concerning the processing, identification, and analysis of flotation samples can be found in Appendix H.

SCREENING METHODS

Depending on research goals and the nature of the deposit, one of three methods were used to screen excavated materials:

1/4-inch (6-mm) control (dry and/or wet)
1/8-inch (3-mm) control (wet)
1/4-inch (6-mm) selective (dry)

All surface transect units (STUs), surface grid units (SGUs), vertical units (VUs), and area exposure units (AEUs) at CCO-459, -468, and -637 were screened using the 1/4-inch control (dry) method. AEUs CCO-458/H were sampled using the 1/4-inch control (wet) method for increased recovery. Five 0.5 x

0.5 m micro-units excavated at CCO-696 were screened using the 1/8-inch control (wet) method. The 1/4-inch selective method was used to screen the subsurface transect units excavated at CCO-637.

1/4-Inch Control (Dry) Method

The 1/4-inch control (dry) method involved passing all excavated materials through 1/4-inch mesh shaker-screens and carefully removing and bagging artifacts and other cultural materials; noncultural residues were discarded in the field. At CCO-696, large screens measuring 4 x 8 ft. were used to speed the recovery process. This apparatus, referred to as a megascreen, was positioned at a 35- to 40-degree angle to form a ramp. Each megascreen consisted of a wooden frame, with cross braces and low side panels or chutes, that was lined with 1/4-inch mesh resting on heavy-gauge fence wire. Teams of two or three people worked the excavated material through the screen, moderating the flow of material down the ramp while collecting the cultural materials. The gravel spoils were tossed back up the screen and reexamined three or four times before being discarded.

The Control (Wet) Methods

The 1/4-control (wet) method proceeded in a manner similar to the dry method, except that initial dry-screening served only to reduce the volume of material. Screen residue was scraped into buckets at the sampling locus. The buckets were then tagged and transferred to the wet-screen station, and all samples were washed through 1/4-inch mesh and allowed to air dry. Once dry, the samples were examined and the cultural materials sorted and bagged. The 1/8-inch control (wet) method followed the same procedure using a finer, 1/8-inch (3-mm), mesh. Water for wet-screening was drawn from a well located near the center of the floodplain, north of the Ordway Ranch complex. Using the well pump, water was delivered to the wet-screening station through garden hoses that were several hundred meters in length. The main hose was split into two separate hoses at the wet-screen station, permitting two or more people to wet-screen using high-pressure spray nozzles.

The 1/4-Selective Method

The 1/4-inch selective method was used exclusively at CCO-637 during the subsurface transect excavation. At this site, the backhoe was used to sample an archaeological deposit buried by 60 to 80 cm of sterile alluvium. The 1/4-inch megascreen was positioned alongside the backhoe excavation, and the backhoe bucket used to deliver trench spoils to the top of the screen. A team of three people was stationed at each screen to moderate the flow of materials while culling cultural materials. Trench spoils were screened only once. The megascreen was regularly repositioned to keep pace with the advancing backhoe excavation and to move away from accumulating piles of screened residue. This method proved to be very effective for identifying areas of concentrated, subsurface cultural materials.

EXCAVATION/COLLECTION UNITS

Surface Transect and Grid Units

Surface transect units (STUs) and surface grid units (SGUs) were 0.5 x 2 m or 1 x 1 m in size and were screened using the 1/4-inch control (dry) method. STUs and SGUs were excavated in arbitrary 20-cm-deep contour levels. STUs were excavated at regular intervals to establish the presence or absence of subsurface cultural materials at CCO-468 and -636. At CCO-458/H, SGUs were excavated to determine the horizontal extent of the deposit and to identify discrete single-component loci within the larger site area. All cultural materials collected from STU and SGU excavations were bagged, labeled, recorded on field records, and the results plotted on a site map. This information was combined with Surface-collection data to identify areas where further excavations might be required.

Vertical Units

Vertical units (VUs) were 1 x 1 m, 0.5 x 2 m, or 1 x 2 m in size and arbitrarily excavated in 10- or 20-cm levels. Referred to as test units (TUs) in the field, they were used for both initial testing and

data recovery. Vertical units provided vertical samples of individual soil units and were screened using the 1/4-inch control (dry) method. Individual VUs were excavated at sites CA-CCO-459, -468, and -636. VU transects were excavated at sites CCO-458/H and -637. The VUs were used for different purposes at each site investigated (see Site Reports for details).

Area Exposures

Area exposure units (AEUs) were excavated to identify and evaluate stratigraphic relationships between subsurface occupation features, as well as to focus labor efforts on the most productive site components identified from surface collection, STUs, SGUs, TUs, and/or geoarchaeological trenching. They were excavated at CCO-458/H, -459, -468, -637, and -696. AEUs were 1 x 2 m or 2 x 2 m in size and excavated in arbitrary 10-cm levels below a unit datum. At sites CCO-459, -468, -637, and -696, AEUs were screened using the 1/4-inch control (dry) method; at CCO-458/H the 1/4-inch control (wet) method was used.

Micro Units

Micro units (MUs), .5 x .5 m in size and 1/8-inch wet-screened, were excavated exclusively at CCO-696 to acquire a sample of fine-grained site constituents. See the site report for CCO-696 for details.

Surface Collection

Systematic surface collection was undertaken at only one site (CCO-458/H). See the site report for CCO-458/H for a description of the methods used.

Subsurface Transect Units

Subsurface transect units (SSTUs) were excavated exclusively at CA-CCO-637. See the site report for CCO-637 for a description of the methods used.

SITE RECORDING AND MAPPING

All Sites

All surface sites investigated had been recorded on official Department of Parks and Recreation forms filed with the Northwest Information Center of the California Historical Resources Inventory. During the Los Vaqueros field work, each site was remapped at a 1- to 2-m contour interval using stadia rods and a David White transit; the maps indicate salient cultural and natural features and all excavation-unit locations. Buried sites identified in the study area were recorded on the DPR form and mapped in the same way as surface sites.

Bedrock Mortar Recording

The bedrock mortars identified at CCO-459 and -469 were recorded following the methods developed by Theodoratus Cultural Research in the Sierra foothills (McCarthy, Blount, and Theodoratus 1985). A plan map was created depicting the relationship of all mortar cups identified at each site. The diameter, depth, and volume of each cup were recorded, and a cross section was drawn. Volume measurements were taken using lentils measured in a graduated cylinder. Cross sections were recorded by forming a piece of pliable, soldering wire to the inside of the cup, then tracing the resulting shape onto a piece of graph paper.

LABORATORY METHODS

PROCESSING AND CATALOGING

All human remains, cultural materials, and natural specimens recovered from archaeological investigations were taken to the ASC Collections Facility at Sonoma State University for processing. Cultural materials were washed in wet screens and cleaned using a soft brush and/or spray bottle. After thorough drying, the materials were separated by class (e.g., faunal bone, shell, milling tools) while maintaining provenience information. Collected materials that were found to be noncultural were discarded.

Each archaeological site was assigned a separate accession number by the Collections Facility, as follows:

CA-CCO-447/H	95-9
458/H	95-2
459	95-3
468	95-11
469 + off site	95-12
631	95-18
636	95-6
637	95-7
696	95-8

A distinctive catalog number, preceded by the appropriate site designation (above), was given each individual artifact or lot of similar artifacts or natural specimens from the same provenience.

Following initial cataloging and descriptive analysis, selected data sets (obsidian, human remains, faunal remains, archaeobotanical remains, etc.) were provided to specialists for more detailed study. All cultural materials were cataloged; except for formal artifacts found in close association with human remains (see below) , all were accessioned as part of the permanent collection.

The count, weight, provenience, and description of all the cultural materials recovered from the project area were entered into a computer program for the purpose of data manipulation and management. Separate, more detailed, databases were created for specific data sets such as the attributes of particular artifact types, obsidian hydration results, radiocarbon dating results, and osteological metric and nonmetric measurements, etc.

Human remains were cleaned by softly rinsing and brushing individual bones, while holding them safely over screens and catch basins. After being air-dried in open screens, the remains were placed in new bags that were labeled for further inventory and analysis. While being processed and analyzed, the remains of each individual were stored separately in a clean, dry, and secure setting at the ASC Collections Facility. See Appendix D for more detail on laboratory methods, as well as detailed descriptions and drawings (where appropriate) of each burial.

Formal artifacts—such as beads, bone tools, groundstone, and projectile points—that were found with or near human burials were classified as "Associations" in the catalog so that they could be easily identified for repatriation purposes. The remaining materials were sealed in new 4-mm-thick plastic bags, labeled, and curated in archive-quality boxes at the Sonoma State University Archaeological Collections Facility.

SPECIAL STUDIES

Radiocarbon Samples

Samples of wood, soil, and charcoal were collected from 20 different locations in the project area for the purpose of radiocarbon dating. Specific information regarding the material type and location of individual samples is presented in table form in the Radiocarbon Studies section in Part IV. The selection of sampling locations was dependent on the availability of datable materials contained within clearly

defined natural or cultural contexts. Bulk soil samples were collected from near the bottom of the A horizon or the top of the B horizon (if present), in accordance with Scharpenseel (1976). Each of the collected samples was placed, stored, and air-dried in new plastic bags that were labeled with the sample's provenience information. The samples were prioritized in the laboratory and submitted for radiocarbon analyses on the basis of sample size, material type, associated context, and research needs. Individual samples were given a project number (LVAP #) before they were submitted to Beta Analytic, Inc. (Beta), of Coral Gables, Florida, for radiometric analyses.

All of the radiocarbon dates were calibrated to sidereal (solar) years using calibrations provided by Beta and the calibration computer program developed by Stuiver and Reimer (1993). We have chosen to report the radiocarbon dates in the text according to calibrated years before the present (cal B.P.) instead of years (A.D. or B.C.) according to the convention of the Julian calendar. For a detailed account of the radiocarbon-dating and calibration methods and for a complete citation of the uncalibrated radiocarbon dates, see the Radiocarbon Analysis section in Chapter 8.

Soil and Sediment Samples

Soil and sediment samples were collected so that detailed descriptions and analyses could be performed in the laboratory. The analyses were conducted to (1) quantify the relative percentages of sand, silt, and clay in a deposit; (2) determine the pH of a deposit; (3) identify depositional environments and site-formation processes; (4) assess the degree of pedogenesis; and (5) facilitate stratigraphic correlation among depositional units.

The texture of the deposits was determined through a particle-size analysis using the hydrometer method (Foth et al. 1982). The acidity or alkalinity (pH) of the deposits was determined using a VWR Model 55 Digital Mini-pH Meter, in a 1:1 mixture of 20 grams of deposit to 20 grams of distilled water (Singer and Janitzky 1986). Standardized reporting techniques and terminology were used to describe the soil and sediment samples (Soil Survey Staff 1975; Birkeland, Machette, and Haller 1991). The results of these analyses are on file at the Collections Facility.

Other Studies

A number of other studies were conducted by specialists to generate additional information on particular data sets in the collection. The specific methods and techniques used in these studies may be found in their respective appendixes, as follows:

Paleontological Identification	B
Human Burial Descriptions	D
Baked-Clay Impressions	E
Wood Identification	E
X-Ray Fluorescence	F
Obsidian Hydration	F
Rock Identification	G
Flotation/Archaeobotany	H
Faunal Studies (Mammal)	I
Fish Remains	J
Shellfish Remains	K

PART III

SITE REPORTS

CHAPTER 6
LOS VAQUEROS PREHISTORIC ARCHAEOLOGICAL SITE REPORTS

INTRODUCTION

This chapter provides a description of the investigations conducted for each location studied during the Los Vaqueros prehistoric archaeological investigations: 7 archaeological sites for which data recovery was completed; 3 locations that were found not to contain prehistoric archaeological components; and 1 location containing redeposited Native American human remains.

In this chapter, the setting is described for each location investigated, followed by a description of the site-specific field methods used. Findings are briefly reviewed, providing a statement on site stratigraphy and formation processes, information on features and burials, an overview of the site's artifact and floral/faunal assemblages, and chronological data. In Part IV, the artifact assemblages are looked at on a project-wide basis, as are chronometric data and burial patterns.

AUGER STATION (S-20)

DESCRIPTION

S-20 was located at Universal Transverse Mercator (UTM) grid coordinates 618400/4193340 (Zone 10), as plotted on the USGS Brentwood, Calif., 7.5' quadrangle (1978), 150 m west of the intersection of Hoffman Lane and the Southern Pacific Railroad tracks (Figure III.1). (Hoffman Lane coincides with the east-west Mt. Diablo Base Line that divides northern and southern townships in the region.) The area is situated along the route of the Old River Pipeline at an elevation of 41 feet (12.5 m) above mean sea level AMSL, in a cultivated field about 33 feet (10 m) south of Hoffman Lane.

Shell fragments that were noted on the surface appeared to originate from a geotechnical auger-test boring at the location. No flaked stone or other artifacts were found in the area. The location was not officially recorded or given a trinomial designation because it was never confirmed as being a site.

FIELD WORK

The location was tested for the presence of a prehistoric site through a single phase that included surface inspection and backhoe-trenching.

Surface Inspection

Investigation of S-20 began with an intensive survey of the surface deposits. A team of three archaeologists walked several transects spaced no more than 5 m apart within a 50-m radius of the area. Ground visibility was excellent due to recent agricultural cultivation of the surrounding field. Several small clamshells of a non-native, freshwater species (*Corbicula* sp.) were found at the surface and collected. Clams of this type are known to inhabit irrigation canals such as the one located immediately north of the area. The presence of these shells at the surface of S-20 probably resulted from the periodic clearing of debris and sediment from the nearby irrigation canal.

Backhoe-Trenching

A total of 9 m^3 of material was excavated by backhoe from one test trench (5 x 3 x .6 m; Trench 10-7-2) in the vicinity of the original geotechnical boring at the site. Backdirt from the trench was raked and spot-screened in an effort to recover any archaeological material present. Trenching was halted when groundwater was encountered at a depth of 3 m. The deposits consisted of a single, weakly developed soil profile formed in fine-grained alluvium.

CONCLUSIONS

No buried paleosols, shells, or cultural materials were observed in the trench. The work confirmed that there was no archaeological deposit at the S-20 location.

CA-CCO-621

SITE DESCRIPTION

CA-CCO-621 ("Flakey Palms") is located at UTM grid coordinates 622700/4194260 (Zone 10), as plotted on the NWIC base map, USGS Woodward Island, 7.5' quadrangle. The site is situated at an elevation of 2 feet (0.6 m) AMSL on reclaimed Delta land west of Old River, south of Highway 4, and 400 m west of the main entrance of Discovery Bay in the Byron Tract. The location, which was to be impacted by the Old River Pipeline Route across the south side of the site, is artificially elevated above the surrounding Delta floodplain on a layer of gravely fill material derived from another location. A drainage canal has been excavated along the western edge of the site. Vegetation at the site includes a thick cover of grasses and forbs, two palm trees, a pomegranate bush, unidentified fruit trees, and an extensive stand of giant bamboo.

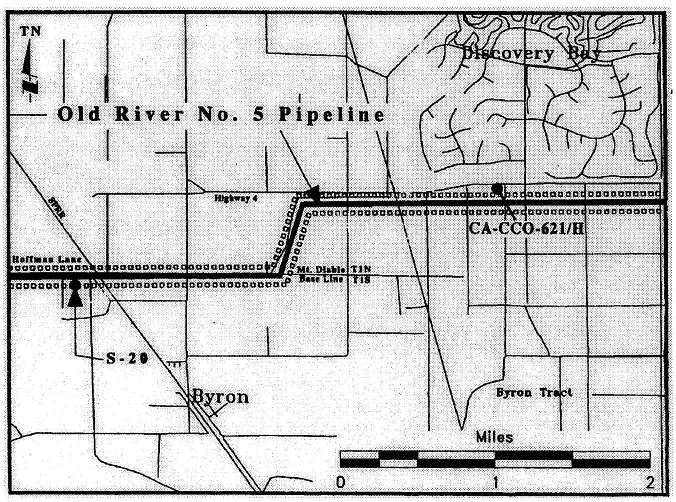

Figure III.1. Location of CA-CCO-621/H and Auger Station S-20 along Old River Pipeline.

The site was originally recorded as containing both prehistoric and historic components. The historic component consists of a sheet scatter of building-related artifacts including brick, concrete, and wood fragments associated with a late-19th-century dwelling that survived until 1990. Domestic artifacts included 19th- and 20th-century white improved earthenware and bottle glass fragments of various colors. A structure is depicted at this location on the USGS Byron 1916 quadrangle (Bramlette et al. 1991b). (The historic component in this location was investigated briefly under the third HPTP [SSUAF 1995].)

The prehistoric component reportedly consisted of several obsidian flakes and biface fragments associated with fill that may have been brought in from outside the site. Previous investigators concluded that "it is likely that the prehistoric component of this site actually reflects another locale" (Bramlette et al. 1991b:17).

FIELD WORK

A single exploratory phase that included backhoe-trenching and an intensive surface inspection was conducted at CA-CCO-621.

Surface Inspection

Investigation of the site began with an intensive surface survey within a 50-m radius of the recorded site area. The surface survey was completed by a team of two archaeologists who walked transects spaced no more than 10 m apart. Areas of exposed soil and rodent backdirt piles were closely examined for cultural materials. No prehistoric archaeological materials were found as a result of surface survey at the site.

Backhoe-Trenching

Test trenches were excavated for archaeological discovery and to examine the subsurface deposits. Backdirt excavated from the trenches was raked and spot-screened in an effort to recover any buried archaeological materials. Sixteen test trenches (4-24-1 to -16) were excavated at 10-m intervals using a checkerboard grid system.

The subsurface deposits consisted of approximately 100 cm of historic fill overlying a layer of rounded gravels that extended to at a depth of at least 150 cm. Trenching was halted at the depth of the gravel layer due to the presence of groundwater. No buried paleosols or archaeological materials were identified in the test trenches. A total of 43.2 m^3 of material were excavated from test trenches at the site.

FINDINGS

As no prehistoric archaeological materials were found during this investigation, and given the artificial setting of the site, it was concluded that the previously reported obsidian flakes and biface fragments constituted an isolated concentration of cultural materials brought into the area as a result of historic-period or modern activities.

CA-CCO-447/H

SITE DESCRIPTION

CA-CCO-447/H is located at UTM grid coordinates 612620/4189060 (Zone 10), as plotted on the Northwest Information Center of California Historical Resources Information System (NWIC) base map, USGS Byron Hot Springs, Calif., 7.5' quadrangle. The site is situated north of the dam site, on a stream terrace in a narrow portion of the upper Kellogg Creek valley at an elevation of 270 feet (approximately 83 m) AMSL (Figures I.3, III.2). The valley is bounded by moderate to steep hillslopes underlain by Upper Createaceous rocks of the Panoche formation. The main channel of Kellogg Creek drains the valley and borders the eastern edge of the site. Annual grasses cover much of the open floodplain, while scattered oak, willow, and buckeye trees are distributed mainly along Kellogg Creek.

The site was originally designated CA-CCO-447H, due to the presence of a historic component that included a square, three-sided, dry-laid stone foundation dating to the 19th century. The site was redesignated CA-CCO-447/H in 1987 after evidence of a buried prehistoric component was discovered while monitoring the excavation of geotechnical test pit LLVEP-2. Examination of the pit walls revealed a deer vertebra and rib with "evidence of butchering with a metal instrument" at a depth of 75 cm below the surface (Bramlette and Villemaire 1987:2). Two culturally modified pieces of flaked stone were identified in the same pit at a depth of 145 cm below the surface, in close association with a layer of freshwater shells. Freshwater shells were found at the same depth in another test pit (LLVEP-3) excavated at the site. Investigators stated that the "newly identified prehistoric/historic components (were) undisturbed due to depth," despite the observation of the on-site geologist that the deposit appeared to be an old streambed of Kellogg Creek (Bramlette and Villemaire 1987:5-6)

FIELD WORK

A single phase of archaeological testing was conducted at the site, consisting of surface inspection, backhoe-trenching, and feature excavation.

Surface Inspection

Investigation of CCO-447/H began with an intensive surface survey. A team of three archaeologists walked several transects spaced no more than 3 m apart within a 50-m radius of the recorded site boundary. Areas of exposed soils, including the stream cut and rodent backdirt piles, were closely examined for evidence of cultural material. All bedrock exposures within the site vicinity were inspected for mortar depressions or other cultural modification (e.g., petroglyphs, grinding slicks). A few pieces of flaked-stone debris were identified on the surface of the site.

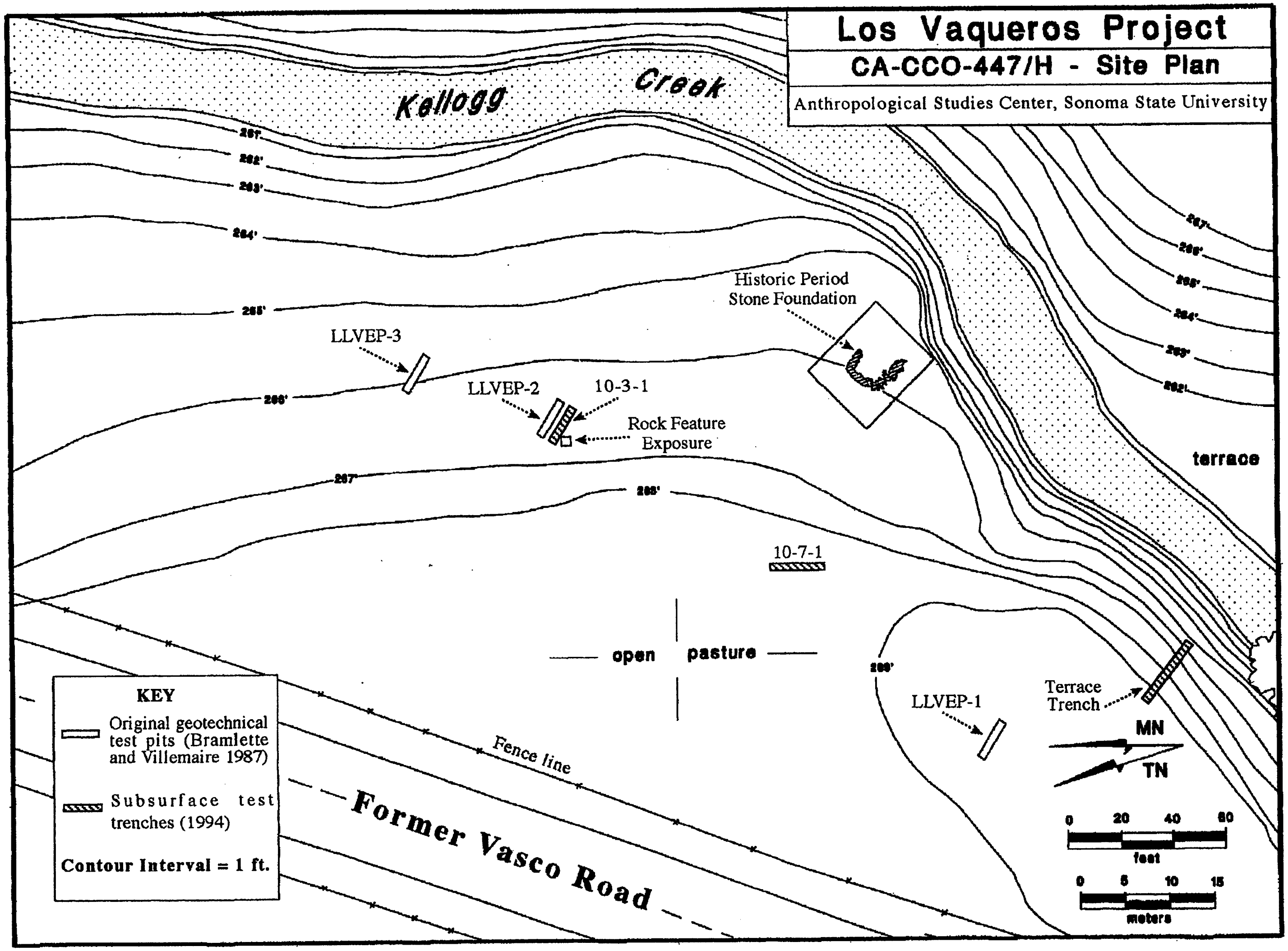

Figure III.2. Site Plan for CA-CCO-447/H, Los Vaqueros Project

Backhoe-Trenching

Test trenches were excavated for archaeological discovery and to examine the subsurface deposits at the site. Three test trenches (10-3-1, 10-7-1, and "Terrace") were excavated in the area where the possible prehistoric cultural materials had been identified in a geotechnical test pit (Bramlette and Villemaire 1987). The original test pit was relocated and re-excavated to expose the same deposits that reportedly contained cultural material (Trench 10-3-1). The walls of the trench were cleared to determine the nature of the deposits and to search for buried archaeological material. An obsidian flake, two nonhuman bone fragments, and several pieces of freshwater mussel shell were found dispersed in a deposit of channel sand and gravel (BCk) over a depth of from 100 to 200 cm. The layer of freshwater shells identified in the original trench was not relocated. An eroded paleosol was found to underlie the channel deposit at a depth of more than 225 cm below the surface. The dispersed archaeological materials represent items that were removed from their original context and redeposited along with the channel sediments. The depositional context of these materials indicated that they did not represent an intact archaeological deposit. A total of 22.5 m^3 were mechanically excavated from the three test trenches at the site.

FINDINGS

Buried Paleosol

A buried paleosol was found to occur at a depth of more than 225 cm; the upper portion of the paleosol, however, had been removed by erosion before being capped by the overlying deposits (Figure III.3). The lack of any significant soil development suggests that the upper alluvium is late Holocene in age. Archaeological materials that may have been associated with the paleosol were likely removed or redeposited by erosive processes in or near the creek channel.

One of the trenches (Terrace) excavated near site CCO-447/H exposed the scour-and-fill relationship of two stream terraces along Kellogg Creek. The lower terrace is inset below the upper terrace, indicating that it is younger that the upper (late Holocene) terrace (Figure III.3). Furthermore, the lower terrace exhibits an incipient soil profile as compared to the soil profile developed in the upper terrace. Since the lower terrace appears to have formed in relatively recent historic times, there was little or no potential for it to contain intact concentrations of buried prehistoric archaeological materials.

Cultural Feature

A cultural feature was identified in Trench 10-3-1 at a depth of 20 to 30 cm below the surface. Using mattocks, shovels, and trowels, a 1 x 1 m unit was hand-excavated to expose the feature . The feature consisted of a small concentration of angular sandstone cobbles that appeared to have been heat-affected. Although a few chert flakes and bone fragments were recovered from the matrix of the exposure unit, no formal artifacts or significant concentrations of archaeological materials were associated with the feature. It is possible that the feature was associated with the historic component at the site. A total of 0.3 m^3 was excavated from the feature exposure unit.

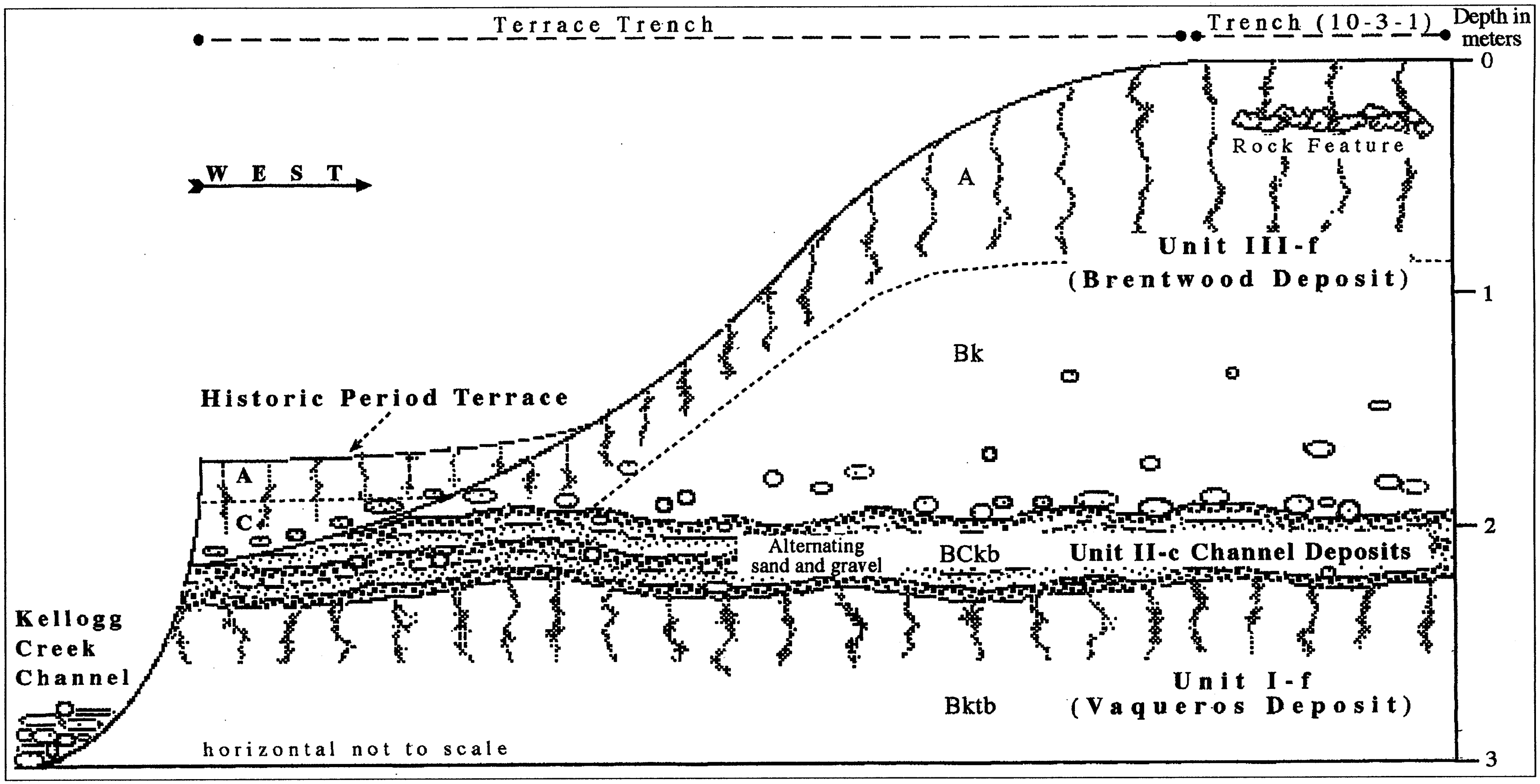

Figure III.3. Buried Paleosol at CA-CCO-447/H

CA-CCO-458/H

SITE DESCRIPTION

CA-CCO-458/H is located between UTM grid coordinates 611740/4188040 and 611680/4187860 (Zone 10) as plotted on the NWIC base map, USGS Byron Hot Springs, Calif., 7.5' quadrangle. The site was situated on the floodplain in the upper Kellogg Creek valley, east of the modern creek channel, at an elevation of 340 feet (104 m) AMSL (Figures III.4, 5). The valley is bounded on the east and west by moderate to steep hillslopes underlain by Upper Cretaceous rock of the Panoche formation. The vegetation of the hillslopes is dominated by a cover of annual grasses with scattered stands of oak occurring almost exclusively on north-facing slopes. The site is covered by annual grasses with stands of oak, cottonwood, and willow trees occurring to the north and south along the banks of Kellogg Creek. A valley oak (*Quercus lobata*) stood as the only tree within the site until February 1996, when it was cut down to make way for construction activities. Although the center of the tree was hollow, a count of the growth rings that remained in a section of the main trunk revealed that the tree was at least 300 years old.

CCO-458/H was composed of a discrete midden deposit containing burnt bone, shell, baked clay, groundstone, heat-affected rock, and obsidian and other stone flaking debris surrounded by a sparse, widespread scatter of stone flaking debris and heat-affected rock. The archaeological deposit was distributed over two levees that paralleled the modern and ancient channels of Kellogg Creek. The site measures 210 m east-west by 210 m north-south, for a total of 34,636 square meters. While the site had been assigned a historic archaeological designation (/H), the historical component was found to lack integrity (SSUAF 1992) and was not further investigated. For the sake of simplicity in this report, the site will be referred to hereafter as CA-CCO-458.

FIELD WORK

Investigations at the site were conducted in two phases. The initial testing phase included cutbank examination, site mapping, backhoe trenching, surface inspection, and surface grid unit (SGU) excavation. The data-recovery phase included vertical unit (VU, or TU) and area exposure unit (AEU) excavation.

Cutbank Examination

Natural cutbank exposures in the Kellogg Creek channel west of the site were examined for archaeological materials/features and to determine the nature and extent of the subsurface deposits. A cutbank, located on the east side of Kellogg Creek about 40 m west of the large oak, was found to contain a thick deposit of alluvium that recorded a sequence of floodplain aggradation, channel cutting and filling, and floodplain stability. The deposits in the cutbank were exposed, documented, and sampled in the field as Profile 2.

Three allostratigraphic units were identified in Profile 2, as shown in Figure II.9 (see Subsurface Survey above). Unit I-f consisted of floodplain alluvium that exhibited a well-developed (Ab/Bktb) soil profile representing the Vaqueros paleosol. A piece of culturally modified flaked stone was found in association with the upper portion of Unit I-f at a depth of 100 cm below the surface. Unit II consisted of alternating layers of sandy and gravelly clay representing a buried channel deposit. The upper portion of Unit II exhibited a weakly developed (A/C) soil profile. Unit III was composed of both channel and floodplain deposits. The lower portion consisted of poorly sorted gravel in a matrix of floodplain alluvium (Unit III-c). The upper portion consisted solely of fine-grained floodplain alluvium (Unit III-f). The upper 75 cm of Unit III-f contained pieces of dispersed charcoal and deer bone that were likely associated with the archaeological deposit at the site. Radiocarbon analysis of four samples obtained from Profile 2 indicated that the entire sequence of alluvial deposits was Holocene in age (see Figure II.9).

Backhoe-Trenching

Three trenches were excavated at the site for archaeological discovery and to examine the subsurface deposits. One trench (12-2-2) was excavated in the western portion of the site and two trenches (not numbered) were excavated in the eastern portion of the site (Figure III.5). Trench 12-2-2 was excavated to determine the extent of the buried channel deposits identified in Profile 2. The trench revealed that the channel had migrated about 20 m to the east before meandering back toward the modern channel to the west. This horizontally discontinuous landscape feature will hereafter be referred to as the "western channel." The morphology of the western channel and the sequence of alluvial deposits observed in the trench were identical to those identified in Profile 2 (Figure II.9).

Two trenches were excavated in the eastern portion of the site across a small topographic depression that marked a buried channel deposit. The depression was noted during the subsurface survey as being a once-active stream channel that had subsequently backfilled with sediment. Both trenches revealed that a laterally extensive channel deposit was present beneath the topographic depression that crossed the eastern part of the site (Figure III.5). This horizontally continuous landscape feature will hereafter be referred to as the "eastern channel." The sequence of alluvial deposits in the eastern channel was best documented to the north of CCO-458, in the east end of Trench 1 at CCO-696. Radiocarbon analysis of five samples obtained from various portions of the eastern channel indicated that the entire sequence of alluvial deposits was late Holocene in age. A total of 18 m^3 of deposits were excavated from test trenches at the site.

Surface Inspection

An arbitrary datum was established south of the recorded site and a grid composed of 63 30 x 30 m squares was laid out on a north-south (magnetic) axis over the entire site area, measuring 300 m (north-south) x 180 m (east-west). Unit designation was determined by distance, in meters, from a primary datum established at the south end of the grid. The grid was systematically examined one square at a time by teams of two or three archaeologists. All cultural materials, including introduced rocks, were pin-flagged. Identified materials were noted and their provenience recorded by bearing and distance, in meters, from the nearest grid point. Only obsidian, bone, and formal artifacts were collected. Based on the data from the surface recording and collection, a map showing the distribution of artifacts and different material types was created. The surface inspection identified areas of concentrated cultural materials to the east (East Locus, or CCO-458 East) and west (West Locus, or CCO-458 West) of the buried eastern channel.

Surface Grid Unit Excavation

Surface grid unit excavation was designed to (1) test the subsurface distribution of cultural materials recognized during surface inspection; (2) determine site boundaries; and (3) recover diagnostic artifacts. Using the grid established for the surface inspection, 1 x 1 m SGUs were excavated at 30-m intervals. The units were excavated in arbitrary 20-cm contour levels and screened using the 1/4-inch control (dry) recovery method. The first tier of investigations consisted of 42 SGUs initiated in the central portion of the site along the N120 line. Units were excavated north and south, beginning on the west side of the grid and moving east. Transect excavation was halted when two consecutive units failed to identify cultural material.

To further define component areas for data recovery, a second tier of 13 1 x 1 m SGUs was excavated at 10-m intervals in the West Locus between transects N90 to N180, and W60 to W120. In the East Locus, two parallel transects, each composed of 6 SGUs, 0.5 x 2 m in size, were excavated along the E10 and E20 lines between N176 and N210. One additional 1 x 1 m SGU was excavated in the East Locus at N190/E20. The second tier of SGUs included a total of 26 units. The results of both tiers of SGUs were recorded on a site map and two areas were selected for more focused excavation. A total of 14.8 m^3 of deposit were excavated from 74 SGUs.

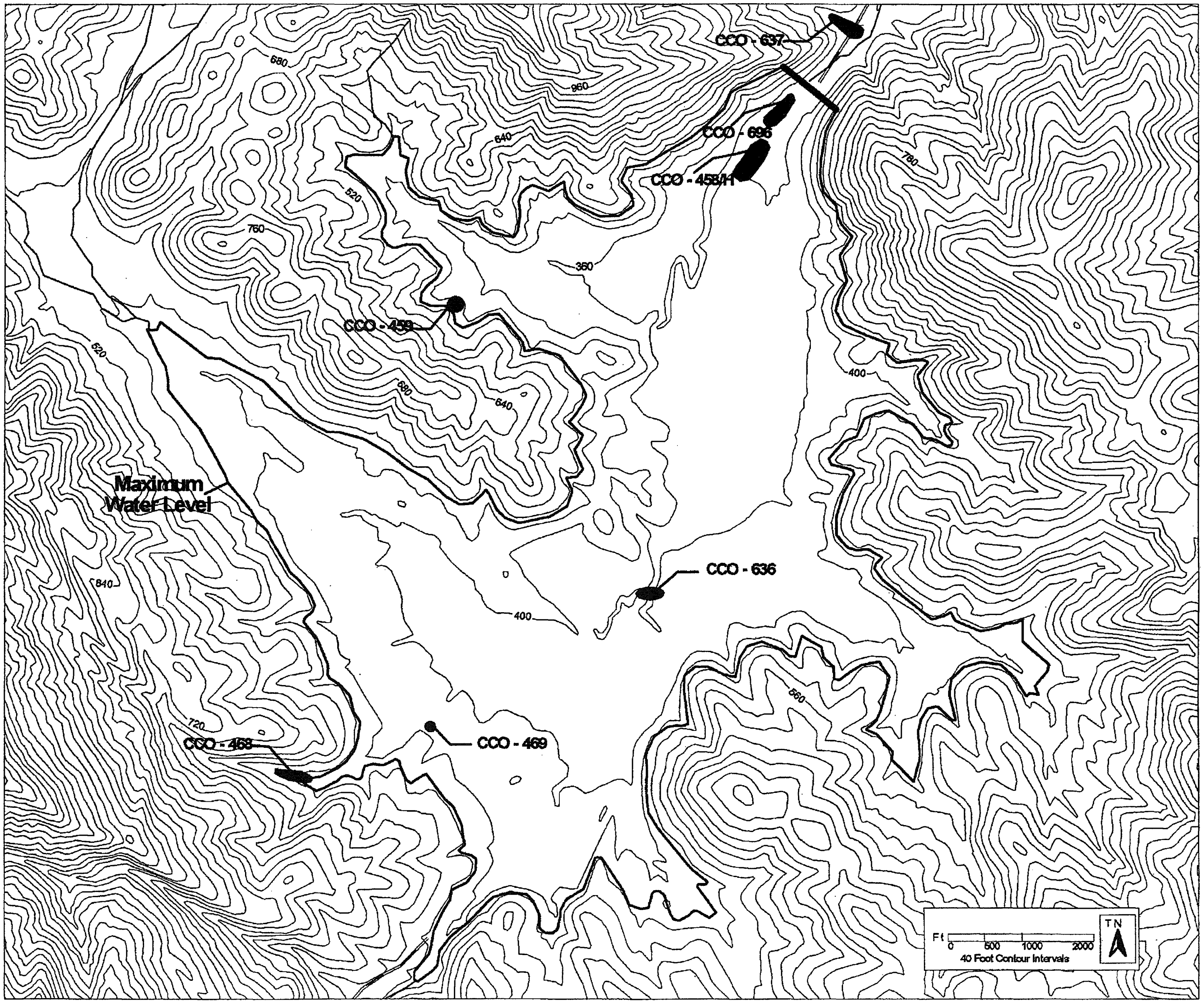

Figure III.4. Prehistoric Archaeological Sites Investigated in the Los Vaqueros Reservoir Area

Area Exposure Excavation

Based on the results of the surface inspection and SGU excavation, two spatial/temporal components were defined at CCO-458. The West Locus was distinguished by a well-developed midden containing numerous obsidian arrowpoints, clamshell and *Olivella* beads, and a high frequency of obsidian flaking debris. In contrast the East Locus was marked by nonmidden soil containing a sparse to moderately dense scatter of chert, siltstone, and quartzite flaking debris and obsidian biface fragments.

Area exposure excavation, which focused on the West Locus, was designed to identify temporally/culturally diagnostic artifacts and discrete cultural features. The area chosen for exposure was found to have the highest densities of diagnostic artifacts, including bone tools, shell beads, and obsidian arrowpoints.

The AEU grid consisted of an 8 x 7 m block of 28 1 x 2 m units extending from N120 to N128 and W103 to W110. Alternating units within the grid were excavated in a checkerboard arrangement to maximize the aerial extent of the exposure. An arbitrary datum was established at the high corner of the grid (N128/W103). Using a line level, all units were excavated in 10-cm arbitrary levels below the datum and screened using the 1/4-inch control (wet) recovery method. Beginning with N126/W110, every other 1 x 2 m unit was excavated moving east (N126/W108, N126/W106, N126/W104). The N124 and N122 lines were similarly excavated, investigating units along the north-south axis not sampled in the previous transect. Eleven 1 x 2 m units were initially excavated in this manner. Units along the N128 line were not excavated.

A stratum of concentrated features, artifacts, and heat-affected rock was encountered by nearly all units between 40 and 50 cm. Below this level, between 50 and 70 cm, a transition layer was identified that was more compact and contained a higher percentage of sand and silt than the overlying midden. Several of the AEUs were halted at this contact. Below the transition zone, a gradual, wavy change to a well developed Bk horizon occurred. Numerous rodent burrows intruded into the transition and Bk horizons, distributing midden and artifacts into these deeper levels.

Seven additional 1 x 2 m units, one 1 x 1 m unit, and five 0.5 x 0.5 m units were excavated to fully expose features and burials, as follows. A house floor (Feature 10) was found and exposed by excavating 2 x 2 m units along the N122 line (N122/W107 and W105) and a block of four contiguous 1 x 2 m units were excavated along the N120 line (N120/W108-W105). A human burial (Burial 1) was found and exposed in a 1 x 2 m unit (N126/W103), and a 1 x 1 m unit (N125/W105) was excavated to expose a portable mortar (Feature 7). Two 0.5 x 0.5 m units (N122.5/W109.5 and N122/W109) were excavated to expose Feature 9 and two 0.5 x 0.5 m units (N124/W107.5 and N124.5/W107) were excavated to fully expose Feature 1. One 0.5 x 0.5 m unit (N122.5/W110) was excavated to expose Burial 2. A total of 25.35 m^3 of site matrix were sampled from the area exposure investigations.

Vertical Excavation

In the East Locus, an area of relatively concentrated cultural material was identified through surface inspection and SGU excavation. Three 1 x 2 m VUs were excavated to increase the recovery of culturally/temporally diagnostic artifacts from this locus. The units were laid out at 4-m intervals along the E20 line (at N196, N200, and N204) and were excavated in arbitrary 10-cm levels and screened using the 1/4-inch control (dry) recovery method. In all units, recovery of cultural material increased in the 40- through 60-cm levels.

The VUs sampled a silty, sandy-loam A horizon to a depth of approximately 60 cm. Below 60 cm, the units encountered a well-developed Bk horizon separated from the upper A horizon by a wavy gradual transition, obscured by numerous active and backfilled rodent burrows. A total of 4.4 m^3 of site matrix was excavated from vertical units.

Column Samples

Two 0.25 x 0.25 m column samples were collected in arbitrary 10-cm levels from the West Locus AEUs. Column 1 (0-40 cm) sampled an 0.5 x 0.5 m balk left over a section of the house floor (Feature 10) in N120/W108. Column 2, which sampled N124/W104 (0-140 cm), was excavated into the north wall of N124/W105. Columns were designed to retrieve stratigraphic samples of plant macrofossils and other fine-grained site constituents.

FINDINGS

Summary Statement

Two spatially/temporally discrete component areas were defined at CCO-458. The areas, identified east (East Locus) and west (West Locus) of the eastern buried channel, were characterized by differences in the overall nature and composition of the artifact assemblages. Temporal variation in the components was corroborated by a radiocarbon date, 71 obsidian-hydration values, and spatial patterning in temporally diagnostic artifact forms.

Site Stratigraphy and Formation Processes

Natural surface deposits at CA-CCO-458 consisted primarily of fine-grained alluvial sediments deposited by episodic, overbank floodplain aggradation. It was these deposits that contained most of the archaeological remains at the site, including those identified within the West Locus. Chronostratigraphic analysis shows that the surface deposits represent the floodplain facies of the Brentwood floodplain facies (665 to 250 B.P.).

Layers of alternating fine and coarse-grained deposits were found at depths of 1.5 to 3 m in some areas, indicating that former stream channels were buried beneath the eastern and western portions of the site. A few widely dispersed archaeological materials were found in association with these channel deposits. Radiocarbon dates from the buried channel deposits suggest that these streams were active between about 2300 and 1000 B.P.

A well-developed paleosol was found below the Brentwood deposit at many locations in the West Locus of the site. Chronostratigraphic analysis shows that the buried paleosol represents the floodplain facies of the Vaqueros deposit (6355 to 2735 B.P.). A few archaeological remains were found to be associated with the Vaqueros deposit at separate locations within the site.

The nature of the deposits in the East Locus was found to differ from those identified in the West Locus. Archaeological deposits in the East Locus were associated with a levee deposit located to the east of the buried eastern stream channel. If overbank flooding along the eastern stream channel was responsible for levee formation at the East Locus, it seems likely that the levee was formed and became available for human occupation between 2,300 and 1,000 years ago, after a period of active channel aggradation. Based on the type and amount of accumulated calcium carbonates, the levee deposit appears to be younger than the Vaqueros, but older than the Brentwood deposit. For this reason, the East Locus levee is considered to occupy an intermediate chronostratigraphic position between the Brentwood and Vaqueros deposits.

The history of landscape evolution at CCO-458 can be interpreted from the landform–sediment assemblage (LSA) identified at the site. Following a prolonged period of mid-Holocene floodplain stability, portions of the Vaqueros paleosol were eroded by late Holocene channel incision and stream migration. Between 2,300 and 1,000 years ago, overbank aggradation along the east side of the eastern channel created a distinctive levee deposit. Beginning about 1,000 years ago, the eastern channel became inactive and the source of overbank aggradation shifted to the western channel. Also around this time, the meander loop on the western side of the site was cut off and backfilled as the channel migrated westward toward its modern course. By 500 years ago, repeated overbank aggradation from the western channel had resulted in the formation of the Brentwood deposit. Since then, the Kellogg Creek channel has become deeply entrenched, increasing its capacity to contain most flood events. This has resulted in floodplain stability and soil formation on the Brentwood deposit.

Post-occupational disturbance processes have affected the systemic context of archaeological deposits in many portions of the site. Foremost among these was the occurrence of thousands of active and inactive burrows (krotovina) excavated by various ground-dwelling animals throughout the site. The subsurface extent of this disturbance was noted in trench walls and other excavated exposures (Figure III.6), with some burrows in the West Locus extending to depths of nearly 150 cm, through the Brentwood and into Vaqueros deposits. The stratigraphic break between the Brentwood and Vaqueros deposits could not be identified due to a combination of anthropogenic and biogenic disturbances in the West Locus area exposure. The remains of the house floor (Feature 10) in the AEUs illustrate that burrowing activity has disturbed many portions of an otherwise relatively intact archaeological feature. Given this, it is likely that some artifacts were displaced from their original systemic context, and that the spatial and temporal relationship of individual artifacts should be interpreted with this in mind.

Burials

Three burials were identified during AEU excavation at CCO-458 West; all were associated with the Brentwood alluvium. Burial 1 consisted of the partially cremated remains of an adult female. Found with Burial 1, were the nonburnt remains of a neonate/infant, designated Burial 3. Wood charcoal collected from the cremation matrix produced a radiocarbon date of 465 cal B.P. Burial 2 consisted of the fragmentary remains of an adult, possible female. (See Appendix D for more detailed descriptions.)

Features

Area exposure excavation at CCO-458 revealed a total of 10 features that appeared to be associated with a single occupation surface between 30 and 50 cm below surface in the Brentwood alluvium. The aggregate of features—including a prepared clay floor, fire-hearth, refuse-filled pits, portable mortar, and several refuse scatters—were inferred to be temporally related, possibly resulting from the activities of a single household.

Feature 1: Refuse-Filled Pit

Identified between 40 and 93 cm below surface in the southeast corner of N126/W108 and the northwest corner of N124/W107, Feature 1 appeared to be a refuse-filled pit, approximately 90 cm in total diameter. The surface of the pit was marked by seven fire-affected sandstone cobbles, ranging between 8 cm and 10 cm in length, resting on and mixed with a 2- to 4-cm-thick layer of compacted, white ash. Portions of the ash lens had been bisected by burrowing animals, distributing ash into the western part of N126/W108. Below the ash layer was a discrete 3- to 5-cm-thick lens of friable, reddened soil containing calcined bone and fragments of freshwater mussel shell. The reddened-soil lens covered approximately the same area as the ash. Below this, to a depth of approximately 72 cm, was a 2- to 3-cm-thick, basin-shaped layer of hardened clayey sediment. Both the reddened lens and underlying compact layer were riddled with krotovina, making it difficult to fully define their areal extent. Beneath the compact layer, ranging between 75 and 86 cm in depth, was a concentration of 8 to 10 sandstone cobbles. Immediately inferior to these cobbles, resting at the bottom of the feature, was the occipital region of an elk cranium. The cranium had the sections of two antlers attached; a third antler base was lying adjacent to the occipital. Eight sandstone cobbles were surrounding the cranium, lying on the same horizontal plane at 93 cm below surface.

Although this feature had been heavily disturbed by burrowing rodents, and no clear pit outline could be defined, the continuous vertical distribution and relatively tight radius of the material, indicated that the fire-affected rock and other material may have been deposited in a pit. After being partially filled with the elk cranium and rocks, the feature may have functioned as a cooking pit, indicated by the compact clay, reddened soil, and ash lenses.

Additional faunal material collected from within the feature matrix included western pond turtle, cottontail rabbit, California ground squirrel, pocket gopher, and fish bones, including elements of unidentified minnow and Sacramento perch. Unidentified faunal bone fragments included carnivore, and small, medium, and large mammal. Several pieces of baked clay were recovered from the feature matrix,

as well as obsidian, chert, quartzite and siltstone flakes. One polished and striated bone tool fragment (95-2-2442), one Spire-Lopped *Olivella* bead (95-2-2443), and one Stockton Stemmed arrowpoint (95-2-2434) were also collected. A flotation sample taken from the ash and reddened zones contained high frequencies of acorn, bay, farewell-to-spring, red maids, and hairgrass, as well as a variety of other small seeds and nuts.

Feature 2: Possible Refuse-Filled Pit

This feature, identified between 40 and 80 cm below surface in the northern half of unit N126/W108, was a possible refuse-filled pit measuring approximately 50 cm in diameter. In plan-view, the feature appeared as a roughly circular patch of yellow-orange sediment, surrounded by the typical dark brown site matrix. The color of the feature matrix was similar to the unaltered C horizon of the Brentwood alluvium. The yellow-orange matrix was found to extend down approximately 40 cm, expanding slightly in width between 60 and 70 cm. A large section of antler tine and a pronghorn horn-core were found lying roughly-horizontally within the yellow-orange matrix at a depth ranging from 73 and 80 cm. Four sandstone cobbles and a Stockton Stemmed arrowpoint (95-2-1770) were found 60 cm to 70 cm below surface in the yellow-orange feature matrix. Higher concentrations of charcoal flecks were noted within the matrix beginning in the 70-cm level. The configuration of Feature 2 indicated that it may have originally been a pit, subsequently filled by sterile overbanking sediments from Kellogg Creek.

Feature 3 (designation dropped)

Feature 3 was assigned to a horizontal surface, later determined to be the natural stratigraphic break between the A and C horizons of the Brentwood alluvium.

Feature 4: Refuse Scatter

Located in the northwest corner of N126/W104 between 20 and 49 cm below surface, Feature 4 consisted of a cluster of seven fire-altered sandstone cobbles in a matrix of ashy soil. The exposed cobbles, 5 to 10 cm in length, were distributed over an area approximately 40 cm in diameter. The cobbles were lying on and within an ashy matrix containing numerous dispersed charcoal flecks. Several rocks were visible in the adjacent sidewalls, indicating that the feature extended into neighboring, unexcavated units. Due to the lack of organization, the feature is inferred to be a refuse scatter resting on an occupation surface.

Feature 5: Ash Layer

Located in the south half of N124/W109 between 32 and 39 cm below surface, Feature 5 was a layer of compacted ash and soil, measuring 40 cm (east-west) x 80 cm (north-south). Five sandstone cobbles were resting on the ash layer along the western margin. Several krotovina impacted the feature, making the original areal extent unknown. Upon excavation of adjacent N122/W110, it was determined that Feature 5 and Feature 9 were portions of a larger ash feature (see Feature 9 for further description).

Feature 6: Refuse Scatter

Identified in the south half of N126/W103 between 22 and 35 cm below surface, Feature 6 was a scatter of fire-affected sandstone cobbles. Measuring approximately 100 cm in diameter, the feature was composed of a loose aggregation of 35+ sandstone cobbles ranging in length between 3 and 20 cm. The feature, resting on a horizontal plane, may have extended into adjacent, unexcavated areas. Due to the widespread scatter and lack of organization, the feature is interpreted as a refuse scatter deposited on an occupation surface.

Feature 7: Portable Mortar

A portable block mortar (95-2-2607), identified between 21 and 49 cm below surface, was designated Feature 7. The mortar was found right-side up, primarily in the southeast quarter of N126/W106, although one edge extended slightly into adjacent unit N125/W105. The mortar, probably undermined by burrowing rodents, dipped to the north. Several sandstone cobbles were resting on and next to the low end. Seven mammal-bone fragments and one piece of freshwater mussel shell (95-2-885) were collected from within the cluster of sandstone cobbles.

Feature 8: Refuse Scatter

Located in the northwest quarter of N124/W109 between 36 and 56 cm below surface, Feature 8 was a scatter of fire-altered sandstone cobbles and baked clay. Resting on a horizontal plane, the feature was composed of a cluster of 11 sandstone cobbles, ranging in size between 3 to 20 cm, and three large pieces of baked clay (reddened), ranging in size from 10 to cm. The sandstone cobbles and baked clay were resting on and within an ashy matrix containing numerous flecks of charcoal. A flotation sample (Sample 24) from the ashy matrix contained a high frequency of acorn, bay, red maids, goosefoot, hairgrass, maygrass, fescue grass, and sunflower, as well as a variety of other small seeds and nuts.

Feature 9: Ash Lens/Hearth

Identified in the northeast quarter of N122/W110 between 39 and 55 cm below surface, Feature 9 was composed of a dense, 4- to 5-cm-thick layer of ash, bordered on the west by a compacted, possibly baked, clay surface. It was determined that Feature 5, to the northeast, was originally part of Feature 9 and was subsequently separated by rodent burrowing. Once fully exposed, Feature 9 measured approximately 75 cm in diameter. The ash appeared well burnt, containing very little charcoal. Below the ash layer was a 10-cm-thick zone of hardened soil. A gradual transition occurred between the ash layer and the underlying zone, indicating that the ash may have developed in place. Along the southwestern margin of the feature, the ash was bounded by a hardened clay surface that abruptly ended in a krotavina; burrowing rodents had also destroyed both the northern and southern edges of the feature. Judging from the apparent in situ development of the feature, relative absence of charcoal in the ash, and the adjacent clay surface, the feature appeared to represent a well-used hearth.

Six sandstone cobbles were resting on the ash and clay surface, as were a canid metapodial, a pronghorn phalange, a white sturgeon scute, and one artiodactyl metapodial fragment. Two antler fragments, one bird bone, and several fragments of medium and large mammal were collected from the feature exposure matrix. Also collected from the exposure matrix were two pieces of baked clay, two obsidian flakes, one Stockton series midsection (95-2-1894), and two Stockton Side-Notched arrowpoints (-1892, -1893). The ash, collected as a flotation sample (Sample 29), was found to contain a high frequency of acorn, manzanita, bay, miners lettuce, plantain, fescue grass, and sunflower, as well as, several other small seeds and nut fragments.

Feature 10: Prepared Clay Floor

This packed clay floor was exposed in N122/W108-W105 and N120/W108-W105 between 29 and 45 cm below surface. The floor was roughly circular, although krotovina appeared to have impacted the edges and bisected the floor in several areas. The original floor would have been at least 3 m in diameter. The compacted clay surface was easily distinguished from the capping matrix, which was a soft uncompacted loamy midden. The exposed surface of the floor appeared almost polished, and close examination of the matrix revealed that it was constructed of a fine clay, unlike the sandy loam occurring in the surrounding site. In cross section, there appeared to have been two and possibly three, 2- to 3-cm-thick surfaces superimposed. The surfaces could be peeled apart, indicating at least two episodes of intentional floor preparation.

A Stockton Side-Notched arrowpoint (95-2-2475) was found resting on the surface of the feature and an artiodactyl ramus fragment was found between the first and second layers of floor. Also identified from the surface was the hypermandibula of a Sacramento sucker fish. An ash and baked-clay layer, approximately 40 cm in diameter, was found beneath the floor in N126/W106, and thus predated floor construction.

Feature 11: Refuse Scatter

Identified in the southwest corner of N120/W108 between 25 and 38 cm below surface, Feature 11 was a concentration of 20+ fire-affected sandstone cobbles. The cobbles, 4 to 15 cm in length, were loosely clustered and covered an area approximately 100 cm (north-south) x 50 cm (east-west). The south and west edges of the feature appeared to extend into the adjacent unexcavated area. The feature was interpreted as a refuse scatter associated with an occupation surface.

Artifact Assemblage

Flaked Stone

Flaked-stone artifacts from CCO-458 included debitage, large and small modified flakes, bifaces, cores, core tools, cobble tools, projectile points, and bipolar cores. Although the vast majority of flaked-stone items were collected from the West Locus, significant differences were observed between assemblages from the two site loci (Table III.1).

Virtually all of the formed tools were from CCO-458 West. Only 8 obsidian biface fragments and 5 cores were recovered from CCO-458 East. A primary distinction between the two site loci was found in the frequency and variability of lithic source material. In the West Locus, the dominant lithic materials are siltstone (69%) followed by obsidian (19%), which combined equal 88% of the total assemblage. Flaked stone collected from the East Locus is more evenly distributed between siltstone (35%), quartzite (31%), chert (16%), and obsidian (9%). The greatest variability in non-obsidian lithic materials was identified in the East Locus, where andesite, diorite, granite, graywacke, and rhyolite are all present; these materials are not found in the West. In comparing the obsidian, Napa Valley source material comprises 94% of the debitage and 93% of the bifaces from the West Locus. In contrast, Napa Valley obsidian makes up only 83% of the debitage and only 37% of the bifaces from the East Locus.

Groundstone

The total groundstone collection from the site consists of 1 block mortar, 1 large bowl mortar fragment, 3 cylindrical pestles, and 12 pestle fragments (Table III.1). The majority of the groundstone was from the West Locus; the large bowl mortar fragment and a pestle fragment were recovered from the East Locus.

Beads and Ornaments

Almost all of the beads and ornaments were from the West Locus. Six classes of marine-shell beads were identified, as were several pieces of *Olivella* bead-manufacturing debris. In addition, soapstone beads and *Haliotis* ornament fragments were collected. A single *Olivella* bead fragment was found on the surface of the East Locus.

Baked Clay

The majority of baked clay from the site was recovered from the area exposure in the West Locus. Based on the grass and other impressions found in the clay fragments, most appear to represent daub used in house construction. Pottery fragments and clay tubes found in the West Locus represent a more formalized use of baked clay.

Faunal Bone

Faunal remains recovered from the East and West loci are distinguished by differences in the frequency of small mammal bone in the two assemblages. Faunal bone from the West Locus was dominated by large (47%) and medium mammal (37%) bone, with small mammal accounting for only 11% of the total assemblage. The majority of faunal bone from the East Locus, in contrast, was made up of small mammal (39%), followed closely by large (37%), and medium mammal (24%). Bird bone was recovered in a slightly higher frequency in the West Locus than in the East Locus, and fish remains were found only at the West Locus. The fish bone consisted of a variety of resident freshwater and 2 anadromous species.

Faunal Shell

Both freshwater and marine shellfish species were identified at the site, primarily from the West Locus. Although not abundant, four marine shellfish species were recovered, including *Macoma*, *Clinocardium*, *Cerithidea*, and *Haliotis*. The only identified freshwater species was *Gonidea Angulata*.

Chronological Data

Radiocarbon Date

A single cultural radiocarbon date of 430 +/- 40, or 465 cal B.P., was obtained from the West Locus of the site. The date derived from charcoal associated with a cremation, Burial 1.

Obsidian Hydration

A total of 75 obsidian samples were submitted for hydration analysis, producing 71 usable hydration readings. These included 64 Napa Valley and 6 Bodie Hills specimens and 1 Casa Diablo obsidian specimen. Fifty-eight hydration values were obtained from the West Locus and 10 from the East Locus. The primary cluster of readings from the West Locus ranged from 2.5 to 1.0 microns (960 to 150 B.P.); a second, older cluster of readings ranged from 3.4 to 2.8 microns (1770 to 1200 B.P.).[1] Hydration values from the East Locus, were ostensibly older than those from the West Locus, ranging from 4.1 to 2.4 microns (2580 to 880 B.P.). Although the hydration profiles from both loci overlap between 3.4 and 2.4 microns, the means of both Bodie Hills and Napa Valley obsidians from the East Locus are almost 1 micron thicker than those from the West Locus, a difference greater than one standard deviation.

Apparent contradictions between the obsidian-hydration dates and the age of the Brentwood alluvium in the West Locus suggest that the older readings may have derived from the underlying Vaqueros paleosol. Given the evidence for natural and cultural disturbance processes (see above) and inasmuch as the break between the two soil units was undetectable in the area exposure, it appears that an older component equivalent to that found in the East Locus may have been buried in the West. Analysis of the hydration results by depth from the area exposure failed to confirm the presence of an older component. In fact, the mean hydration readings were younger with depth, supporting the other evidence for stratigraphic mixing.

Projectile Points

Projectile points were recovered only from the West Locus. Virtually all were small, temporally diagnostic point forms (Table III.1), although one large quartz, leaf-shaped point was also collected. The small projectile points all represent types dating to the Lower and Upper Emergent periods. Consistent with findings by Bennyhoff (in Elsasser 1978) and Fredrickson and Origer (1995), the hydration readings from the Stockton Stemmed points in the Los Vaqueros collection were found to be older, on average, than the Stockton Side-Notched points (see Obsidian Analysis in Chapter 8). Converted to years before present, the mean Napa Valley hydration date from the stemmed points was 670 B.P. (2.1 microns) and the mean from the side-notched points was 345 B.P. (1.5 microns), indicating that the stemmed points are primarily Lower Emergent and the side-notched points primarily Upper Emergent.

The vertical distribution of small projectile points recovered from the AEU exposure generally substantiates the relative chronological placement of the point types. On average the Stockton Stemmed points were the deepest (41 cm) and the Stockton Corner-Notched were the shallowest (13 cm). The other three point types had an identical mean depth of 30 cm.

Shell Beads

Six bead types were identified at CCO-458, including 16 *Olivella* Spire-Lopped, 12 Lipped, 4 Thin Rectangles, 3 End-Ground, and 1 Small Saddle bead, as well as, 17 clamshell disk beads. All specimens, except for 1 *Olivella* bead fragment, were collected from the West Locus. According to Bennyhoff and Hughes (1987: Scheme B1), two of the six bead types represented in the CCO-458 assemblage date to the Upper Emergent (clamshell disk and *Olivella* Lipped beads), post 500 B.P.; three date to the Lower Emergent (Spire-Lopped, End-Ground, Thin Rectangle), 950 to 500 B.P.; and one dates to the late Upper Archaic (Small Saddle), 1500 to 950 B.P.

The average depth of the different bead types recovered from AEU excavation contrast somewhat with the temporal sequence just described. The End-Ground beads, which date to the Lower Emergent, had the shallowest average depth, while the Lipped beads, which date to the Upper Emergent, had the third deepest average depth. The differences in the average depth of the other four types, however, correspond well with their relative ages.

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[1]All hydration values are for Napa Valley obsidian or have been converted to the Napa Valley rate in accordance with Tremaine (1989, 1993); age estimates are based on Origer (1987). See Obsidian Analysis section in Chapter 8 for details.

TABLE III.1
COMPONENT ASSEMBLAGES CA-CCO-458

Flaked Stone	West	East
Small projectile points		
Corner-notched	5	-
Side-notched	59	-
Stemmed	18	-
Preform	5	-
Desert Side-Notched	4	-
Panoche Side-Notched	7	-
Large projectile points		
Leaf shaped	1	-
Bifaces		
End	22	1
Margin	20	3
Midsection	19	2
Tip	30	2
Small modified flakes		
Chert	1	-
Obsidian	44	-
Siltstone	1	-
Large modified flakes		
Chert	1	-
Siltstone	1	-
Bipolar cores		
Obsidian	14	-
Cobble tools		
Quartzite	2	-
Core tools		
Siltstone	1	-
Cores		
Basalt	1	-
Chert	2	2
Siltstone	1	-
Quartzite	1	3
Debitage		
Nonobsidian		
Andesite		3
Basalt	33	3
Chert	588	58
Dacite	4	3
Hornfels	1	5
Petrified wood	10	-
Quartz	27	14
Quartzite	1,293	113
Rhyolite	-	2
Siltstone	11,714	129
Obsidian		
Annadel	3	-
Borax Lake	-	1
Bodie Hills	21	3
Casa Diablo	1	1
Napa Valley	401	25
Not sourced	2,863	-

	West	East
Groundstone		
Mortars		
Large bowl mortar	-	1
Small block mortar	1	-
Pestles		
Cylindrical	2	-
Indeterminate	1	-
Fragments	12	1
Polished Stone		
Beads	4	-
Tube fragments	2	-
Tabular fragments	1	-
Cylinders	1	-
Minerals		
Quartz crystal	1	-
Iron oxide	25	-
Pigment-stained stone	3	-
Actinolite	1	-
Fossil		
Oyster-shell fragments	3	-
Modified Bone		
Antler tip	4	-
Bead	2	-
Bi-pointed pin	5	-
Curved-to-flat	12	-
Single-pointed, blunt	6	-
Single-pointed, sharp	12	-
Tube	5	-
Shell Beads		
Olivella		
Spire-Lopped	16	-
End-Ground	3	-
Lipped	11	1
Thin Rectangle	4	-
Small Saddle	1	-
Clam		
Disk	17	-
Faunal		
Mammal/bird bone	53,802	284
Frsehwater mussel shell	999	3
Marine shell	60	-
Baked Clay		
Shaped	18	-
Impressed	3,612	-
Lumps	14,738	20

[*Note*: Also 1 diorite, granite, and graywacke debitage at East Locus.]

Summary of Chronological Data

Based on site stratigraphy, obsidian hydration, a radiocarbon date, and the spatial variation in time-diagnostic artifact forms, two temporal components were defined at CCO-458. Obsidian-hydration readings from the East Locus indicate that occupation was primarily associated with the Upper Archaic and first part of the Lower Emergent (2500 to 880 B.P.).

Although the obsidian-hydration results suggest an earlier component was present at the West Locus, the chronostratigraphic position of the deposit, a radiocarbon date, and virtually all of the time-diagnostic artifacts are indicative of the Emergent period.

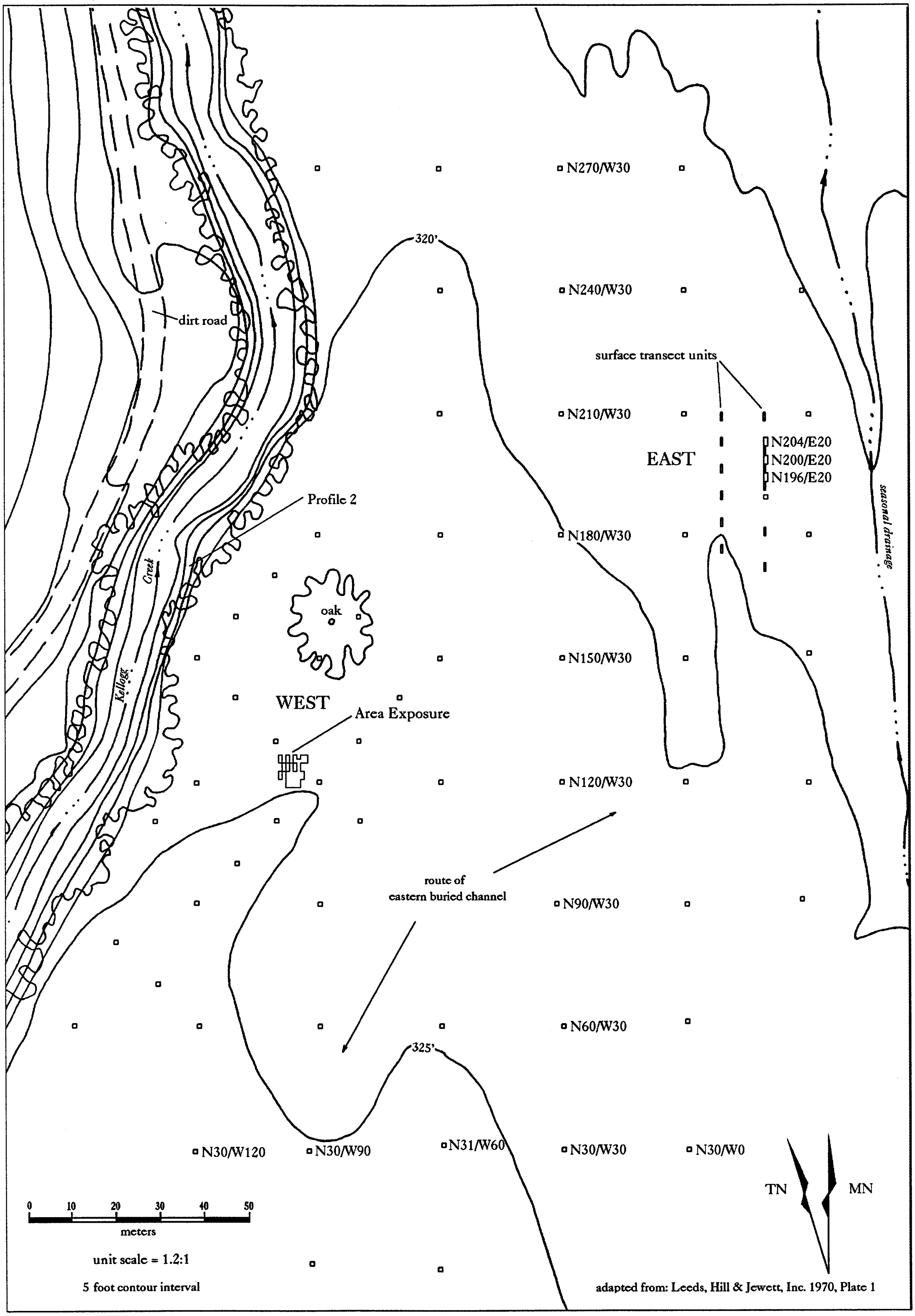


Figure III.5. Site Plan for CA-CCO-458, Los Vaqueros Project

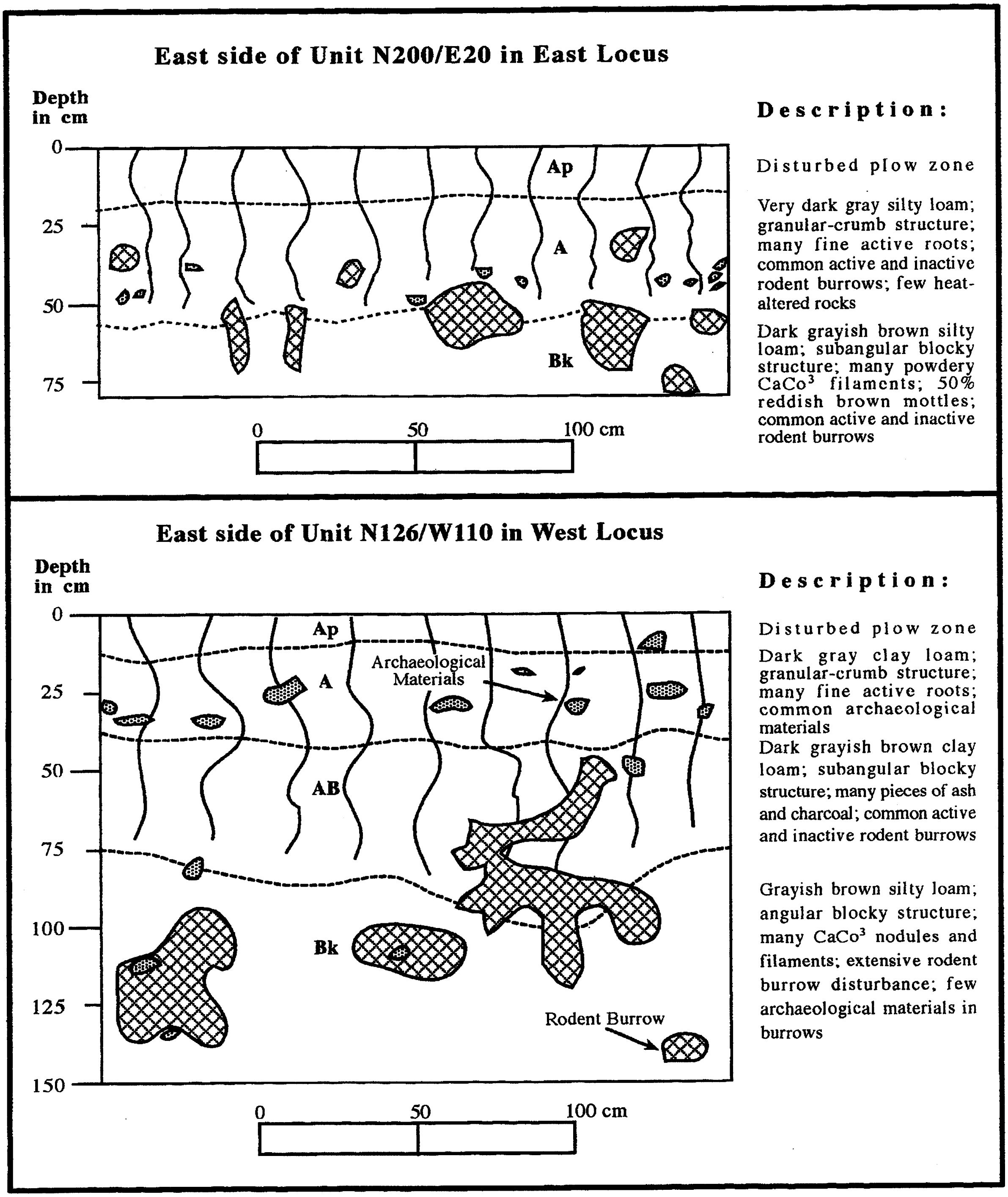


Figure III.6. Soil Profiles, CA-CCO-458

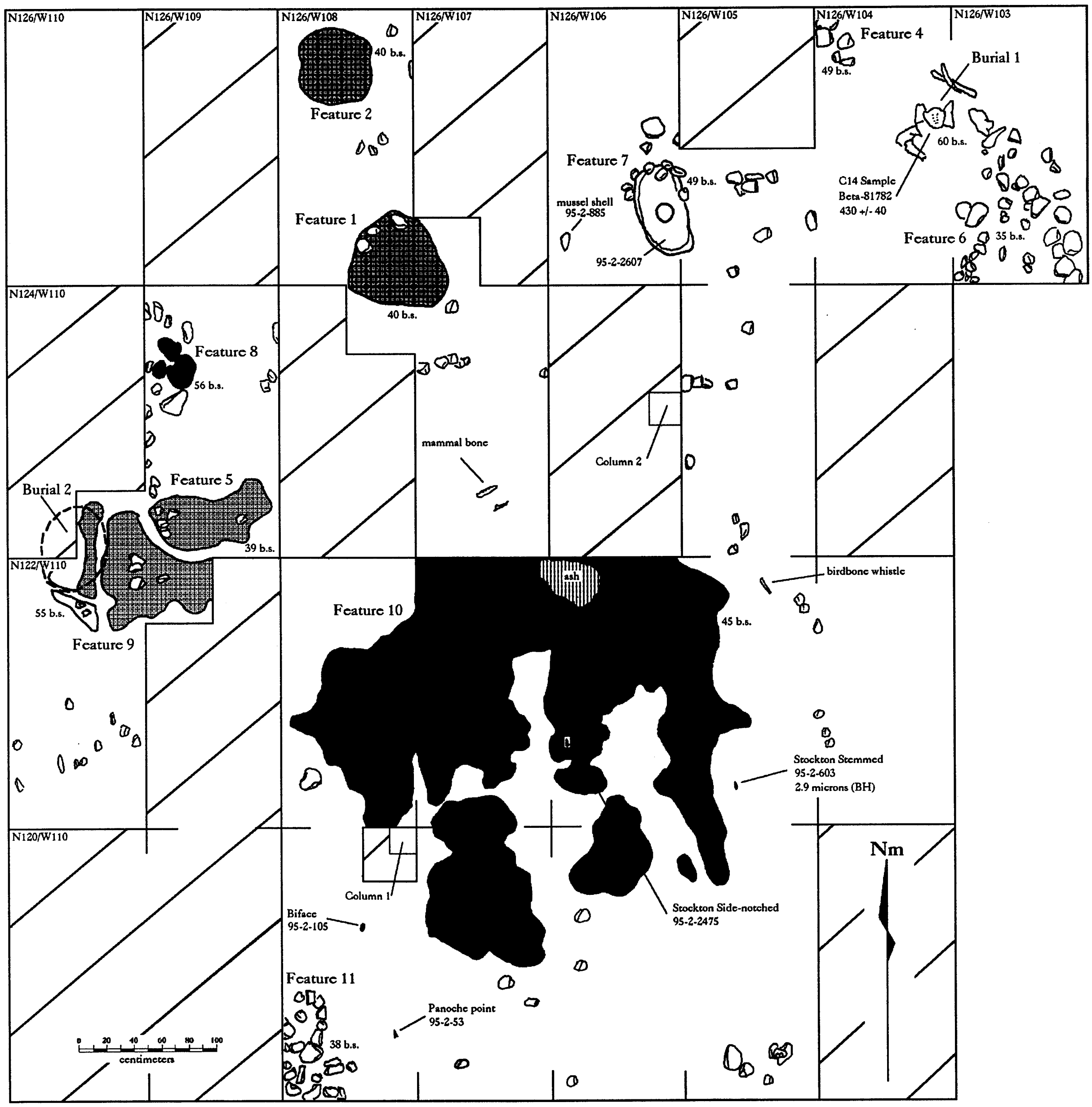


Figure III.7. Feature 10 Exposure, CA-CCO-458

CA-CCO-459

SITE DESCRIPTION

CA-CCO-459 is located at UTM grid coordinates 610520/4187320 (Zone 10) as plotted on the NWIC base map, USGS Byron Hot Springs, 7.5' quadrangle. The site, a bedrock milling station and buried archaeological deposit, is situated at an elevation of 460 feet (140 m)AMSL on a north-facing slope in one of several narrow bedrock hollows within the northwest arm of the upper Kellogg Creek valley (Figures III 4, 8). The western edge of the site is bounded by a deeply entrenched, seasonal drainage channel. A large outcrop of sandstone boulders covered with a dense growth of willows dominates the site. The moderately sloping hills and valley floodplains north of the site are covered with annual grasses, while stands of oak and buckeye trees occupy much of the steeper, north-facing hills to the south.

CCO-459 was initially recorded as consisting of five bedrock mortar cups located on two separate sandstone outcrops. Four mortar cups were originally associated with the larger of the two outcrops, while a single mortar cup was associated with a smaller outcrop located to the east. No other evidence of human use was recorded at the site. As a result of this investigation, an additional 13 mortar cups and a buried archaeological deposit were recorded at the site. The site measures approximately 60 m east-west by 50 m north-south, covering an area of 2,356 square meters. The site will periodically be covered by water when the proposed reservoir is inundated.

FIELD WORK

Field work at the site was conducted in two phases. The initial exploratory phase included site mapping, backhoe trenching, and surface survey. The mitigation phase included VU and AEU excavation, mortar recording, and flotation sampling.

Surface Inspection

An intensive surface inspection was conducted within the recorded site and surrounding area. All areas of exposed bedrock were carefully examined for evidence of human use. The vegetation and organic debris that covered nearly 50% of the main outcrop were removed by hand, with some mechanical assistance provided by a backhoe. Three previously unidentified mortar cups were exposed as a result of outcrop clearing.

Backhoe-Trenching

Two test trenches were excavated at the site for archaeological discovery and to examine the subsurface deposits. The first trench (10-6-1) was excavated parallel to the base of the main BRM outcrop, while a second (Trench 10-6-2) was excavated perpendicular to the outcrop (Figure III.8). The depth of trenching was determined by the depth of the underlying bedrock contact (200 cm maximum). The deposits, which were composed of colluvium from the hillslopes, contained many angular clasts. The colluvium formed a wedge-shaped deposit at the base of the outcrop that was slightly thinner downslope. The upper 25 cm of the deposits (Unit III) exhibited a weakly developed (A/C) soil profile. Another weakly developed (Ab/Cb) buried soil profile (Unit II) was identified at a depth of 25 to 75 cm below the surface. A moderately developed (Ab/Btb) buried soil profile (Unit I) was identified at a depth of 75 to 100 cm below the surface in Trench 10-6-2. Finally, a buried bedrock mortar cup (#10) was found while clearing the bedrock surface at the base of Trench 10-6-2. A total of 9 m^3 of deposit were excavated from the two trenches at the site.

Exposure 1

Based on the results of backhoe-testing, a 2 x 5 m area exposure was created perpendicular to the outcrop (Exposure 1, Figure III.9). The exposure was laid out on the west side of the north/south-

trending backhoe trench (10-6-2), leaving an 80-cm balk between the exposure and the trench. Using the trench profile as a guide, 20 to 40 cm of Soil Unit A and the upper zone of Unit 2Ab were excavated with the backhoe, removing approximately 4.0 m^3 of soil. The exposure was leveled and the side walls straightened using mattocks and shovels. An arbitrary datum was established at the southwest corner of the exposure (S0/W0) and five contiguous 1 x 2 m units were laid out south along the W0 axis (S0-S4). The backhoe trench (10-6-1) excavated parallel to the bedrock outcrop bisected the exposure in S3/W0. Two narrow balks were left between the trench and adjacent units S2/W0, and S4/W0. The balks were later excavated in a single level and screened using the 1/4-inch control (dry) recovery method.

The initial depths below surface of each unit were recorded using a line level below the high corner of the exposure wall, next to the unit corner. All units were excavated in arbitrary 10-cm contour levels and screened using the 1/4-inch control (dry) method. The same level was excavated in each unit before a new level was started, allowing continuous exposure of the paleosol (Unit 3Ab) and widespread features. The level that encountered the buried soil was excavated stratigraphically so that the two soils were not mixed. The contact between the upper and lower soils was encountered at depths (below surface) ranging from 78 cm in S0/W0 to 92 cm in S4/W0. There was a dramatic decrease in the frequency of cultural material recovered from the lower soil unit (3Ab). Only two units (S0/W0 and S4/W0) were excavated more than one level into this soil. A total of 4.7 m^3 of deposit were hand-excavated and sampled from Exposure 1.

The exposure encountered three features and two portable mortars. One pit feature (Feature 4), one possible pit with an adjacent rock scatter (Feature 1), and a heat-altered rock concentration (Feature 2) were recorded. To fully expose Feature 2, an additional 1 x 2 m unit (N1/W0) was excavated 0 to 70 cm on the north side of S0/W0. The feature exposure unit was excavated in a single level, and 1.4 m^3 of matrix were discarded.

The rock features and mortars were exposed, recorded, and mapped in situ. Flotation samples were collected from all three features, the feature pedestals were excavated, screened, and recovered materials placed in appropriate level bags. One large, broken mortar found in S4/W0, was measured, described in the field, and left on site. The second mortar, found in unit S1/W0, was removed for curation and the pedestal screened.

Exposure 2

A second exposure was created to uncover a rock feature identified in the east wall of Trench 2. The backhoe was used to remove 40 cm, or approximately 4.8 m^3 of overburden (Soil Units A and 2Ab), creating an exposure measuring 3 x 4 m. The grid established for Exposure 1 was expanded east and a block of two 1 x 2 m units was laid out along the east axis (S0/E5, S1/E5), leaving a 1-m-wide balk between the exposure and backhoe trench. The initial depths from surface of each unit were recorded using a line level below the highest corner of the exposure wall, next to the unit corner. Both units were excavated in arbitrary 10-cm, contour levels and screened using the 1/4-inch control (dry) recovery method. Concurrent excavation of both units encountered a continuous distribution of rock (Feature 3) in the second level. A third unit (S2/E5), measuring 0.8 x 2 m, was excavated between S1/E5 and Trench 2 to fully expose Feature 3. The feature was isolated, drawn, and recorded, and a sample was taken for flotation. A total of 2.36 m^3 of deposit were excavated by hand from Exposure 2.

Vertical Units

Two vertical units were excavated at CCO-459. Unit 1 was a 1 x 1 m unit excavated in a shallow, circular depression initially recorded as a house pit. The unit was excavated to 30 cm in arbitrary 10-cm contour levels. The unit encountered no cultural material or evidence of a floor. A total of 0.3 m^3 was sampled from Unit 1.

Unit 2 was excavated just north of Exposure 2 along the east axis of the grid (N1.5/E5), leaving a 50-cm stratigraphic balk between the unit and AEU. Unit 2 measured 1 x 2 m and was excavated to 60 cm below the original ground surface in arbitrary 10-cm contour levels. The unit was designed to

obtain a control sample of Soil Unit A and the upper zone of 2Ab, neither of which were sampled during AEU excavation. The buried soil, 3Ab, was encountered in the 50- to 60-cm level. A total of 3.56 m^3 of deposit were sampled from Unit N1.5/E5.

Bedrock Mortar Exposure and Recording

The bedrock at the southern end of Exposures 1 and 2 was exposed by removing the A and 2Ab units in a single level using mattocks and shovels. Approximately 2.6 m^3 of sediment from the western side were discarded, while approximately 1.6 m^3 of sediment excavated from the eastern side were screened using the 1/4-inch control (dry) recovery method. Removal of the overlying deposits revealed nine additional buried mortar cups in the exposed bedrock. Sediment that filled buried mortar cups were collected for radiocarbon dating.

Ultimately a total of 18 mortar cups were identified at the site. The diameter, depth, and volume of each mortar cup were recorded. A plan map of the main BRM outcrop was created and a cross section of each mortar was drawn.

Column Samples

Two column samples were excavated for flotation analysis at CCO-459. Column 1 was an 0.5 x 0.5 m unit excavated in the balk between S0/W0 and Trench 10-6-2. The column was initiated at the depth of the backhoe exposure and was excavated from 36 to 126 cm below surface in arbitrary 10-cm contour levels. Column 1 sampled Soil Units 2Ab and 3Ab. The level that encountered the 3Ab unit was excavated stratigraphically, and the upper (2Ab) and lower (3Ab) soils collected in separate samples.

Column 2, 0.25 x 0.25 m, was excavated on the north wall of N1.5/E5. The column was excavated from surface to 60 cm in arbitrary 10-cm contour levels. Column 2 sampled Soil Units A and 2Ab.

FINDINGS

Site Stratigraphy and Formation Processes

Natural deposits at the site consisted primarily of fine-grained colluvial deposits that also contained many angular gravels and cobble-size rocks. These deposits were formed by the relatively steady and occasionally rapid accumulation of materials from upslope locations at the base of the hillslopes. Together, the processes have formed alluvial-colluvial fan deposits that are interfingered at the base of the bedrock outcrop. Three distinct stratigraphic units, each with some degree of soil development, were identified at the site.

Nearly all of the archaeological materials at the site were found in association with the lower portion of the upper buried paleosol (Cb horizon of Soil Unit II); a few were also found in Units I and III. Based on radiocarbon dates from natural contexts, the primary cultural deposit is bracketed between 1620 and 500 cal B.P. The radiocarbon dates obtained from cultural features (Features 2 and 3, see below) are consistent with this chronostratigraphic assignment. This is also consistent with the stratigraphic position of the 8 bedrock mortar cups (#10 through 17) that were buried within the Ab horizon of Unit II (Figure III.9). The chronostratigraphic evidence strongly indicates that prehistoric use of the site was primarily associated with the Cb horizon in the lower part of Unit II.

The history of landscape evolution at CCO-459 can be interpreted from the LSA identified at the site. Alluvial and colluvial deposits originating from the drainage to the southwest of the site led to the formation of the Unit I fan more than 1,600 years ago. This was followed by a relatively long period of hillslope stability, as indicated by the moderately well-developed soil profile exhibited in the Unit I fan. Prehistoric use of the site appears to have begun around 1,300 years ago during this period of stability. Alluvial and colluvial deposits originated from the drainage to the southeast of the site, buried the surface of the Unit I fan and led to the formation of the Unit II fan beginning about 900 years ago. Prehistoric use of the site continued through this period of slow but steady fan aggradation, which appears to have lasted for about 400 years. This was followed by a brief period of hillslope stability and

soil development that was interrupted relatively recently by the deposition of Unit III over the surface of the Unit II fan. Like Unit II, the Unit III fan deposits originated from the southeast drainage.

There is evidence to suggest that post-occupational disturbances have affected the systemic context of the archaeological deposits in some portions of the site. Many active and inactive burrows (krotovina), excavated by various ground-dwelling animals, were observed at the surface of the site. Yet despite the extent of burrowing disturbance at the surface, only a few burrows were noted in trench walls and other excavated exposures. This suggests that only limited portions of the cultural deposit have been affected by these processes. Since the full extent of these disturbance processes could not be determined, the spatial and temporal relationship of individual artifacts should be analyzed and interpreted with this in mind. CA-CCO-459

Burial

The fragmentary remains of a single neonate/infant were identified in the laboratory. The human remains were recovered from the upper portion of Soil Unit II overlying the bedrock outcrop at the southern end of Exposure 2. Radiocarbon dates obtained from mortar cups found buried directly below the skeletal remains indicate that the interment was less than 920 cal B.P.

Features

Area exposure excavation at CCO-459 revealed four features: one rock hearth, one refuse scatter, and two pit features. All of the features were related to Soil Unit II.

Feature 1: Pit With Refuse Scatter

This feature, identified at a depth of 71 to 94 cm below surface in S2/W0 and S3/W0, was composed of a pit and scatter of fire-affected sandstone cobbles that extended into the west wall of Exposure 1. In plan view, the feature was composed of a cluster of 15 to 20 sandstone cobbles covering an area of approximately 60 x 80 cm. A concentration of charcoal flecks was intermixed with the cobbles in the southwest portion of the feature. The cobbles were resting on a horizontal plane in Soil Unit II, just above the contact with Unit I. In cross section, a pit filled with Unit II matrix was visible extending approximately 30 cm into Unit I (Figure III.10). The pit was adjacent and below the southwest corner of the rock and carbon concentration. The pit had previously been bisected by Trench 10-6-1, but was still visible in the north wall of the backhoe trench and in the feature pedestal.

The overall structure of the feature indicated that it may have functioned as a cooking pit. The spatial association between the fire-affected rock/carbon concentration and the pit suggested that the former may have been discarded from the latter during or subsequent to some kind of processing activity.

Five fragments of mammal bone were recovered from the feature matrix. A flotation sample was collected from within the charcoal/rock concentration (Sample 48). The sample yielded several pieces of acorn, manzanita, and wild cucumber seeds, and a variety of small seeds, dominated by grasses (i.e., hairgrass, fescue, and maygrass).

Feature 2: Rock Hearth

Located between 77 and 99 cm below surface in AEUs N1/W0 and N0/W0, Feature 2 was a tightly organized concentration of fire-affected sandstone (Figure III.11). The feature, situated in Soil Unit II, was roughly circular, measuring approximately 130 cm in diameter. The sandstone cobbles varied in size from 3 to 30 cm and were arranged in a single course, resting just above the contact with Soil Unit I. The organization of the feature indicates that it may have been purposefully constructed as a hearth or similar cooking facility.

From the exposure matrix of Feature 2, 21 fragments of burnt and unburnt mammal bone and 4 pieces of siltstone were recovered. Charcoal collected from the sandstone concentration produced a radiocarbon date of 1320 +/- 70 B.P., or 1265 cal B.P. A flotation sample collected from the feature (Sample 49) contained acorn nut shell and several types of small seeds, the most numerous of which was sage.

Feature 3: Refuse Scatter

Extending from unit S0/E5 through much of S2/E5 at a depth of 54 to 69 cm below surface, Feature 3 was a scatter of fire-affected and unaltered sandstone cobbles. The unorganized concentration of 100+ cobbles measured 270 cm (north-south) x 180 cm (east-west) and was resting on a roughly horizontal plane in Soil Unit II. The majority of cobbles ranged in length from 2 to 20 cm; one large (65 x 40 cm) cobble was located on the southwest edge of the feature. Within the matrix were concentrations of charcoal flecks, larger pieces (ca. 4 cm in diameter) of charred wood, and several fragments of burnt soaproot (95-3-182). Due to the wide distribution of the materials and lack of organization, the feature was interpreted as discarded refuse accumulated on an occupation surface.

The feature matrix contained 10 fragments of burnt and unburnt mammal bone and 3 pieces of siltstone. Large pieces of charred wood recovered from the feature produced a radiocarbon date of 605 cal B.P. A flotation sample (Sample 50) collected from the matrix contained a variety of nut fragments and small seeds, dominated by acorn nut shell, goosefoot, sunflower, and fescue grass.

Feature 4: Pit

This feature, identified between 53 and 119 cm below surface in the west wall of AEU S4/E0, was a pit extending from Soil Unit II approximately 40 cm into Soil Unit I. The feature, not recognized during excavation, was visible in cross section after the unit was completed. At the widest point, the pit measured 65 cm across and was filled with Soil Unit II matrix. Several small sandstone cobbles appeared to be resting on the bottom of the pit. Although no clear function could be assigned to this feature, it was similar to Feature 1 and may have been used for processing (a cooking pit?) rather than for storage.

A flotation sample (Sample 51) collected from near the bottom of the feature contained a high frequency of acorn nut shell, redmaids, and sunflower, as well as several other types of nut fragments and small seeds.

Bedrock Mortars

Both large and small bedrock mortar cups were recorded at CCO-459. Nine of the mortars were exposed at the surface, while an additional 9 were buried by Soil Units II and III. All of the mortar cups were located above the level of Soil Unit I, indicating that they were probably established following the formation of the deepest paleosol. Based on the soil date from unit I and the oldest cultural radiocarbon date from unit II (Feature 2), it appears that the bedrock mortars were established after 1620 B.P. but no later than 1265 B.P. Soil from the most deeply buried cup (#10) produced a date of 920 cal B.P., while soil from a cup (#16) close to the modern surface produced a date of 500 cal B.P., indicating that the bedrock outcrop was buried over a 420-year interval.

The 9 buried mortar cups, which ranged in depth from 20 to 90 cm below the surface, were all large. In contrast, the 6 small mortar cups were all exposed at the surface, along with 3 large mortars. Given that none of the small mortar cups was buried, the vertical separation of the two mortar types on the outcrop suggests that the small cups were probably created after the large cups had been buried (post 900-500 cal B.P.).

Artifact Assemblage

A small, diverse collection of formal artifacts was recovered from CCO-459 (Table III.2). These include portable mortars, a pestle fragment, modified bone fragments, a baked-clay tube fragment, and a shaped, baked-clay object. The flaked-stone assemblage consists of cores, a cobble tool, a modified flake, and debitage. The dominant flaked-stone material is siltstone (73%), followed by chert (14%) and obsidian (9%). Faunal remains made up the single largest class of material recovered from the site. The assemblage is primarily composed of large (43%), medium (25%), and small mammal bone (32%), although, some bird and fish bone was also identified. Shellfish included a small collection of unidentified freshwater and one marine shell fragment (*Macoma nasuta*).

Chronological Data

Dating for CC0-459 is based on 5 radiocarbon dates and 11 obsidian-hydration readings. There were no beads, projectile points, or other temporally diagnostic artifacts recovered from the site.

Radiocarbon Dates

The 5 radiocarbon dates were obtained from natural and cultural contexts at the site. Three natural dates were derived from bulk soil samples—one associated with the Ab horizon of Soil Unit I and two from buried bedrock mortar cups associated with the upper portion of unit II (Ab). These natural dates bracket the age of the cultural deposit between 1620 and 500 cal B.P. Radiocarbon dates of 1265 and 605 cal B.P. from cultural Features 2 and 3, respectively, are consistent with their chronostratigraphic position in the lower portion of Unit II.

Obsidian-Hydration Readings

Eleven obsidian specimens were submitted for hydration analysis. The results corresponded reasonably well with the radiocarbon dates from the deposit. Napa Valley obsidian-hydration readings ranged from 5.2 to 1.3 microns (4148 to 259 B.P) with the primary cluster of readings ranging from 2.7 to 1.7 microns (1118 to 443 B.P.).

Summary

Based on the combined obsidian-hydration and radiocarbon dates, the entire site assemblage appears to represent a single Upper Archaic/Emergent-period component, dating approximately 1265 to 440 B.P.

TABLE III.2
COMPONENT ASSEMBLAGE CA-CCO-459

Flaked Stone		**Groundstone/BRMs**	
Small modified flake		Large bowl mortar	1
Obsidian	1	Unique block mortar	1
Cobble Tool		Pestle fragment	1
Graywacke	1	BRMs - small mortar cups	6
Cores		BRMs - large mortar cups	12
Siltstone	8	**Modified Bone**	
Quartzite	1	Antler tip	1
Debitage		Bi-pointed pin	1
Basalt	1	Single-pointed, sharp-tipped	1
Chert	32	**Faunal**	
Dacite	2	Mammal/bird Bone	1,276
Obsidian	21	Freshwater mussel shell	15
Quartz	2	**Baked Clay**	
Quartzite	2	Shaped	2
Siltstone	156	Impressed	1
		Lumps	2

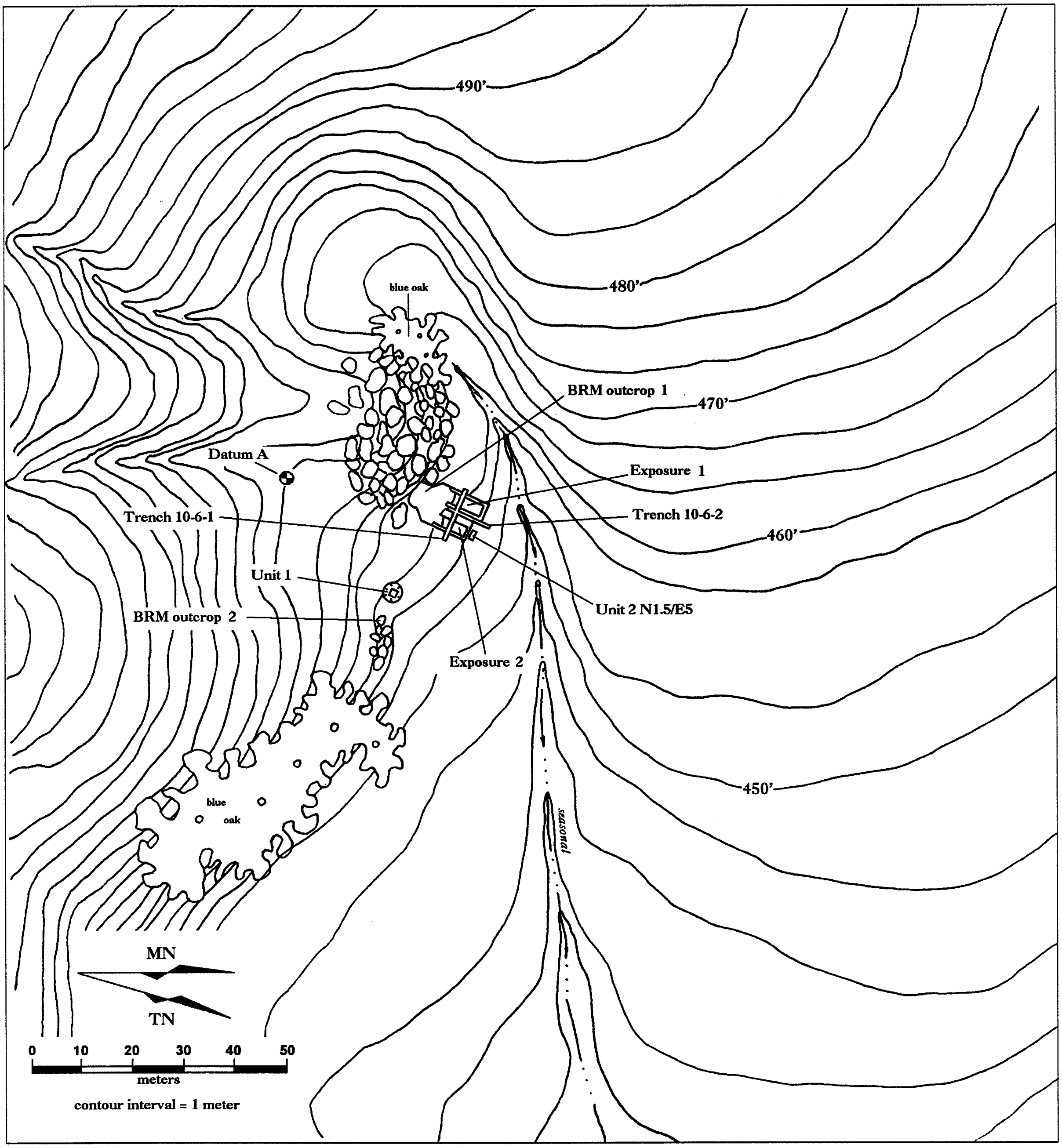


Figure III.8. Site Plan for CA-CCO-459

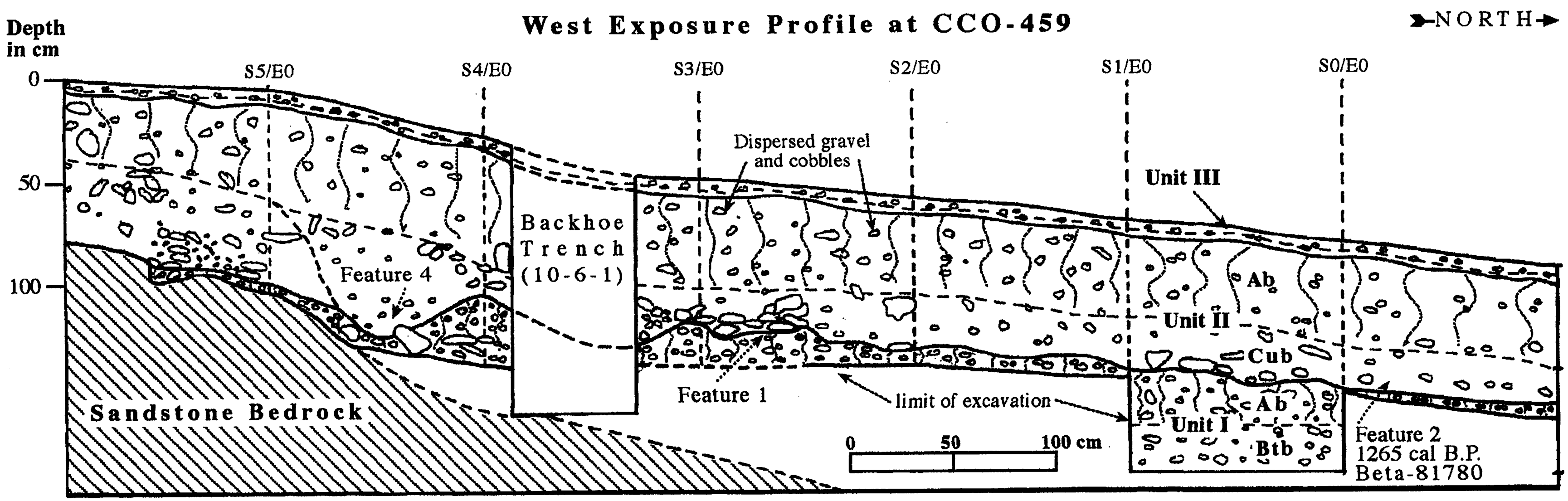


Figure III.9. West Exposure Profile, CA-CCO-459

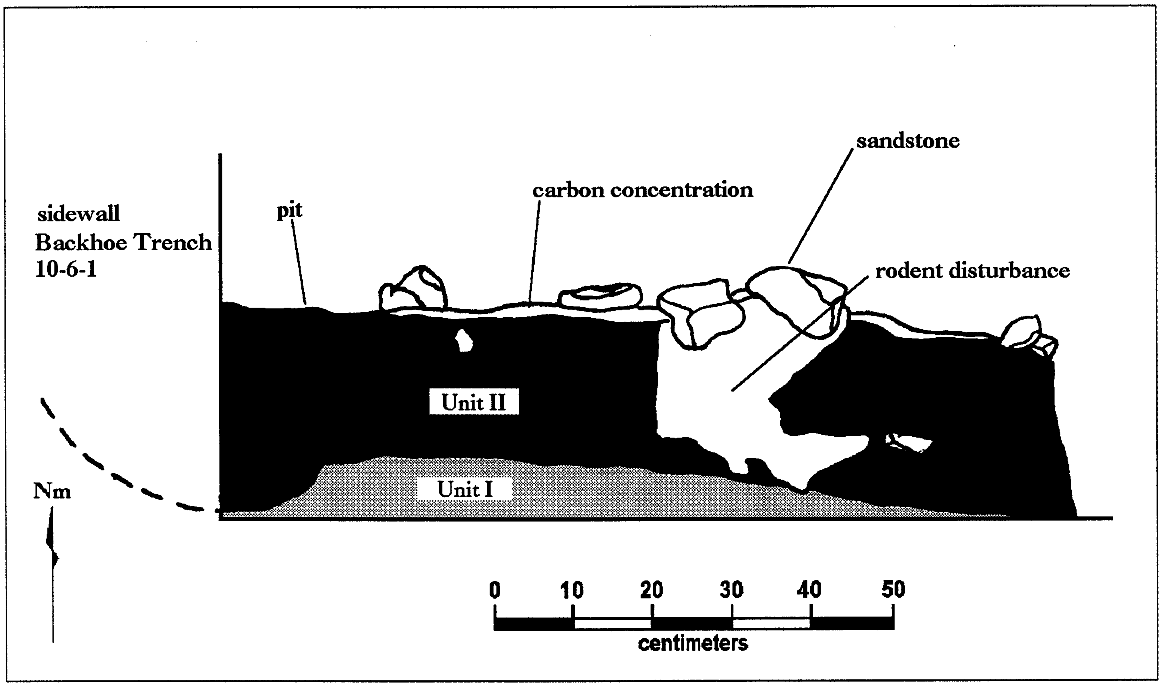


Figure III.10. Profile of Feature 1, CA-CCO-459

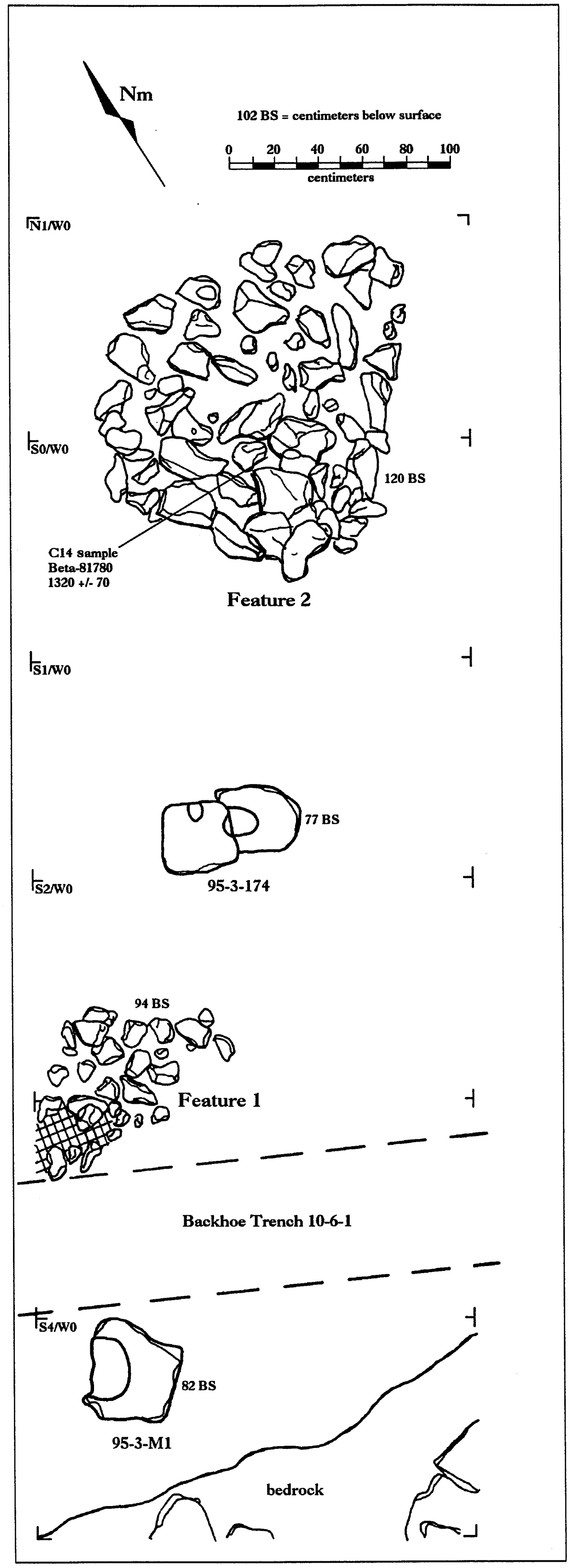


Figure III.11. Plan of West Exposure with Features 1 and 2, CA-CCO-459

CA-CCO-468

SITE DESCRIPTION

CA-CCO-468 is located at UTM grid coordinates 609970/4185130 (Zone 10), as plotted on the NWIC base map, USGS Byron Hot Springs, Calif., 7.5' quadrangle. The site is situated at an elevation of 520 feet (159 m) AMSL, within a narrow arm at the southern end of the Kellogg Creek valley (Figures III.4, 12). The valley is bordered on the north and south by moderate to steep hillslopes underlain by Upper Cretaceous rock of the Panoche formation; the slopes form a narrow canyon west of the site but are further apart on the east. An unnamed seasonal tributary of Kellogg Creek passes through the site; prior to reservoir/dam construction, the creek reached the larger valley floodplain approximately 750 m northeast, near site CCO-469. CA-CCO-468 will be just above the maximum water level of the proposed reservoir.

Many partially buried sandstone boulders and cobbles were found protruding from the alluvium on the valley floor. The rocks appear to have been deposited by an ancient landslide or debris-flow. The alluvium that surrounds the rocks exhibited a weakly developed soil profile indicating that it has been stable for a relatively short period of time. Most of the site was covered with a thin growth of annual grasses, with a few large oaks on the valley floor.

The site measures approximately 50 m (east-west) x 150 m (north-south), for a total area of approximately 5,890 square meters. Surface evidence at the site included two portable hopper mortars and several bedrock mortar cups located on widely separated sandstone boulders. The "rock shelter" noted in the original site record was relocated. This feature consisted of two rows of dry-laid, stacked rocks that extended at right angles from the sheer face of a low, sandstone outcrop. A low earthen dam had been mechanically constructed across the drainage in the southcentral portion of the site, creating a small reservoir pool that was dry at the time of excavation.

FIELD WORK

Investigation of site CCO-468 was conducted in a single phase that included an intensive surface examination, site mapping, mortar recording, STU, VU, and AEU excavation, feature exposure, and flotation sampling.

Surface Inspection

Investigations at CCO-468 began with an intensive surface examination of the entire site area. Exposed bedrock outcrops were inspected for evidence of prehistoric modification, such as mortar depressions and cupules. Areas of exposed soil were searched for archaeological materials. A total of 6 mortar cups were identified on five sandstone boulders scattered throughout the central and western portion of the site. In addition, 2 hopper mortar slabs and 1 obsidian flake were found in a 4 x 4 m area in the central portion of the site.

STU Excavation

A total of 11 Surface Transect Units (STUs) were excavated and screened using the 1/4-inch control (dry) recovery method. STUs were designed to define the areal distribution of the deposit and to identify areas of concentrated cultural materials. Two transects, spaced 10 m apart, were laid out parallel to the long axis of the drainage. Each STU was identified with reference to its distance, in meters, from the primary site datum. STUs measuring 0.5 x 2 m were excavated in a single 20-cm-deep contour level, alternating at 10- to 20-m intervals, depending on the distribution of sandstone boulders. A total of 2.4 m^3 was excavated from STUs.

TU Excavation

Two 1 x 1 m test units (TUs) were excavated and screened using the 1/4-inch control (dry) method. One TU (Unit 1), placed in the center of the rock feature to determine the origin of the rock alignments, was excavated in 10-cm contour levels to a total depth of 50 cm. A historic ash feature containing square-cut nails, glass, ceramic fragments, and a button was encountered in the 40 to 50 cm level. Unit excavation was abandoned following identification of the feature. A total of 0.5 m^3 was excavated from Unit 1.

To identify the maximum depth of the prehistoric deposit, the most productive STU was enlarged and excavated to culturally sterile soil. Unit N0/W50 was expanded 50 cm north (N0.5/W50) to create a 1 x 1 m TU. The unit was excavated in 10-cm contour levels to a maximum depth of 40 cm for a total volume of 0.4 m^3.

Area Exposure Excavation

Area exposure units (AEUs) were laid out around the two hopper-mortar slabs that were thought to represent a discrete prehistoric work area. A subdatum was established at the northeast corner of the grid, and each unit was identified with reference to this point. Six contiguous 1 x 2 m AEUs were laid out to form a 3 x 4 m area. Three of the units, which made up the western half of the exposure, were subsequently excavated. Two of the units, N0/W0 and N0/W2, were excavated in 10- cm contour levels to a maximum depth of 30 cm. The third unit, N0/W1, was excavated in a single 30-cm-deep level. A total of 1.8 m^3 of deposit were excavated from the AEUs.

Mortar Recording

A total of 8 mortar cups were recorded at CCO-468, including five bedrock outcrops with 1 or 2 mortar cups each and 2 portable mortars. The diameter, depth, and volume of all the mortars were recorded and each was photographed. The distribution of mortar outcrops and portable mortars was plotted on the site map. The portable mortars were left on site.

FINDINGS

Site Summary

No discrete loci or notable concentrations of cultural materials were identified. Significant site attributes included a rock hearth (Feature 1) and a total of six small bedrock mortar cups located in five separate sandstone boulders.

Site Stratigraphy and Formation Processes

Natural surface deposits at CCO-468 consisted of fine- and coarse-grained alluvial and colluvial deposits that contained many gravel-, cobble-, and boulder-size rocks. The surface deposits were relatively shallow, exhibiting a weakly developed soil profile. Based on the type and degree of soil development, the surface deposit appears to represent a chronostratigraphic equivalent of the Brentwood floodplain facies (665 to 250 B.P.). The radiocarbon date of 60 +/- 70, or 250 cal B.P., from Feature 1 at this site is considered to be the minimum limiting date for the Brentwood deposit. No other information is considered relevant for understanding the stratigraphy or site-formation processes at CCO-468.

Feature

Feature 1

The single feature identified at CCO-468, exposed beginning in the western wall of unit S10/W40, was a tight concentration of fire-affected sandstone. The feature was a single, roughly oval-shaped layer of rock, measuring 85 cm (north-south) x 62 cm (east-west). The sandstone cobbles that made up the concentration ranged in size from approximately 5 to 20 cm; most were about 10 cm in diameter. Feature 1 was found just below the current ground level at a maximum depth of 23 cm. The discreteness

and uniformity of the feature indicated that it was purposefully constructed, possibly representing a cooking hearth (Figure III.13).

A burned acorn was collected from within the rock concentration. One Stockton Stemmed arrow point was recovered from the feature exposure matrix. The specimen, made of Napa Valley obsidian, had a mean hydration value of 1.1 microns. A radiocarbon sample of charred wood collected from the feature produced a date of 250 cal B.P.

Artifact Assemblage

Excavations at CCO-468 produced a sparse but relatively diverse assemblage. Formal artifacts were limited to 4 Stockton series projectile points and 2 small block mortars. The projectile points and 12 of the 13 recorded flakes were Napa Valley obsidian. The bulk of the assemblage was made up of faunal remains, dominated by large mammal bone. A single piece of marine shell (*Clinocardium*) was also recovered.

Chronological Data

A single Upper Emergent-period component was defined at CCO-468. Chronological placement was based on a radiocarbon date of 250 cal B.P. and Napa Valley obsidian-hydration values ranging from 2.3 to 1.1 microns (812 to 186 B.P.), with a mean of 1.4 microns (301 B.P.). The hydration readings were obtained from the 4 temporally diagnostic projectile points, including 3 Stockton Side-Notched and 1 Stockton Stemmed point.

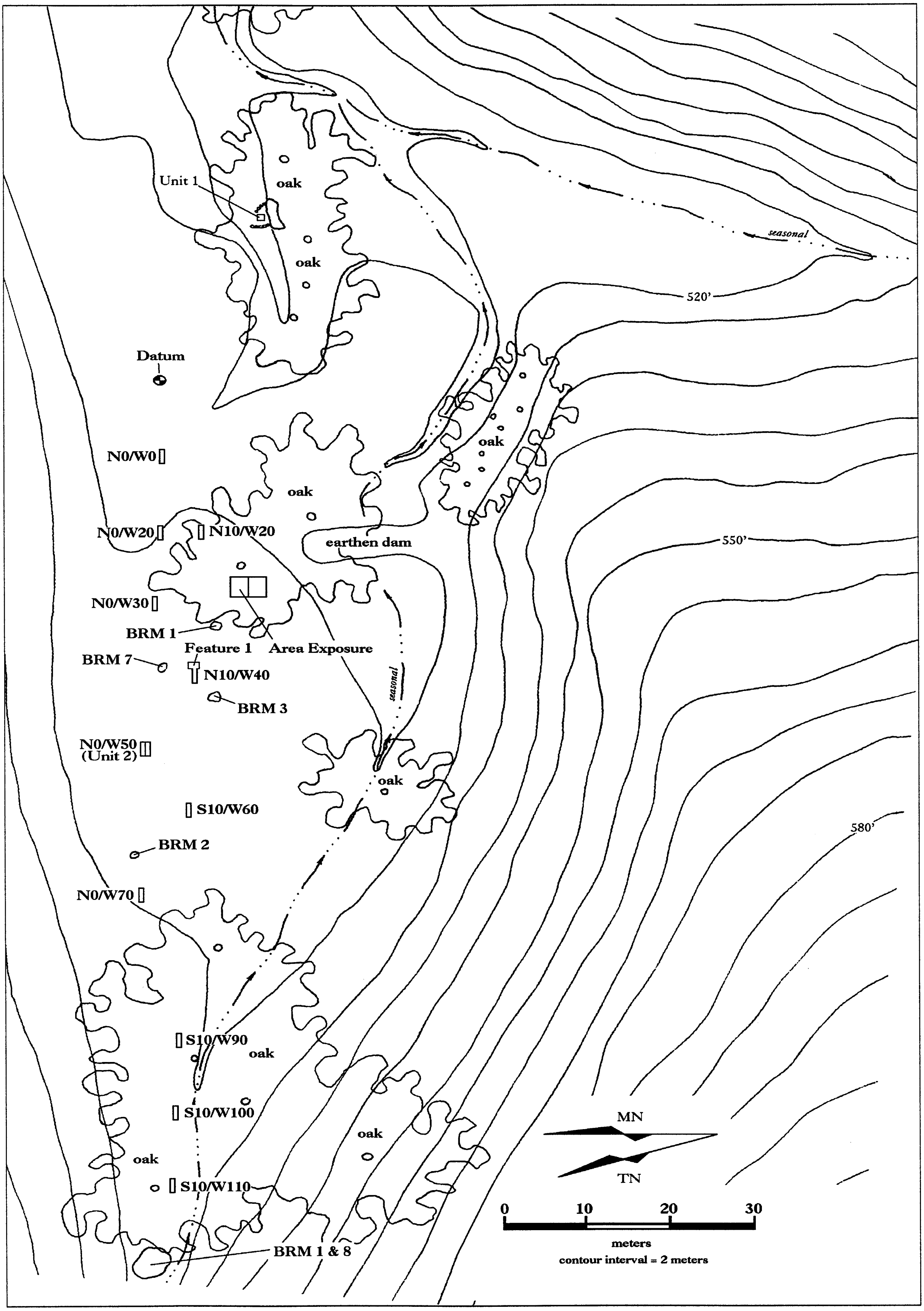


Figure III.12. Site Plan for CA-CCO-468, Los Vaqueros Project

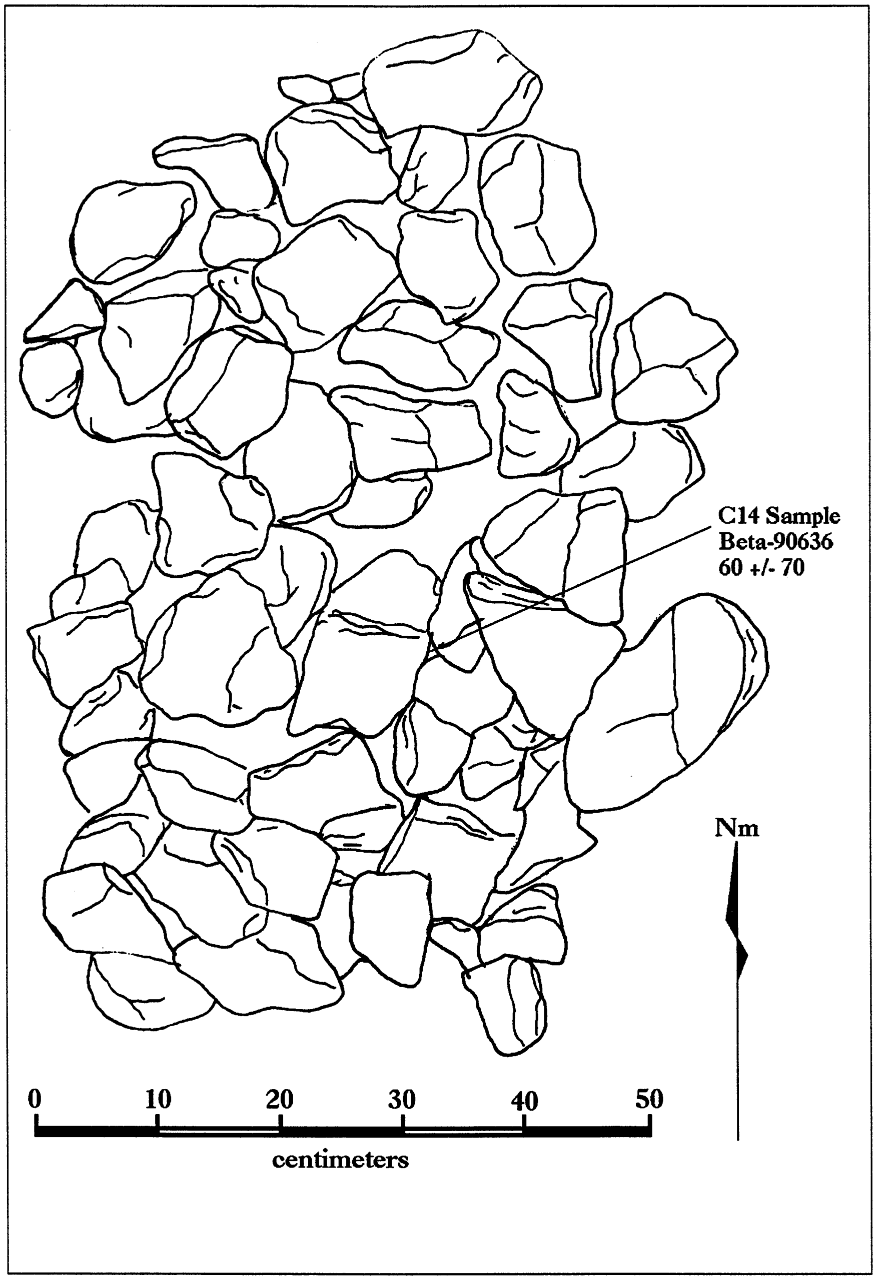


Figure III.13. Feature 1, CA-CCO-468

CA-CCO-469

SITE DESCRIPTION

CA-CCO-469 is located at UTM grid coordinates 610500/4185460 (Zone 10), as plotted on the NWIC base maps, USGS Byron Hot Springs, Calif., 7.5' quadrangle. The site is situated at 410 feet (125 m) AMSL on the north-facing slope of a low ridge at the southern edge of the Kellogg Creek valley (Figure III.4, 14). A small seasonal tributary runs northeast along the western edge of the ridge; prior to reservoir/dam construction, the creek had its confluence with the west branch of Kellogg Creek several hundred meters northeast of the site. Vegetation in the immediate vicinity of CCO-469 consists of scattered oaks and open grassland. Valley oaks (*Quercus lobata)* are distributed continuously along the creek to the north, decreasing in frequency with distance from the drainage.

The site is made up of two outcrops of Upper Cretaceous sandstone of the Panoche formation that contain 10 shallow mortar cups. Nine of the 10 mortar cups were found on a nearly flat sandstone outcrop measuring 5.6 m (north-south) x 3.8 m (east-west). A single mortar cup was identified in a small boulder located about 5 m east of the main outcrop. A historical berm or ditch had been excavated parallel to the base of the slope, intersecting the natural watercourse just north of the BRM outcrop. The site will be inundated periodically when the proposed reservoir attains its maximum water level.

FIELD WORK

Surface Inspection

Investigation of CCO-469 began with an intensive survey within a 100-m radius of the site. Areas of exposed soils, including the stream cut and rodent backdirt piles, were closely examined. All bedrock exposures within the site vicinity were inspected for additional mortar cups or other indications of cultural modification (e.g., petroglyphs, grinding slicks). No additional evidence of prehistoric use was identified. The site vicinity was mapped from an arbitrary site datum established at the top of the low ridge using a standard transit and stadia.

Mortar Recording

The main bedrock mortar outcrop was cleared of accumulated sediments using shovels, trowels, and other hand tools. Six mortar cups were originally identified on the outcrop. Removal of overlying colluvium on the eastern side revealed three additional shallow mortar cups. Depth, diameter, and volume measurements were recorded for all 10 cups, and a plan map of the main outcrop was created. The mortar cups ranged from 4.5 to 10 cm in diameter and 1.1 to 2.3 cm in depth.

Backhoe-Trenching

Two exploratory backhoe trenches were excavated. One trench (10-4-1) was excavated parallel to the main mortar outcrop, exposing the hillslope deposits. Another trench (10-4-2) was excavated in a stream terrace formed by the seasonal drainage northwest of the outcrop, exposing the floodplain deposits. The trenching spoils were raked and spot-screened for cultural materials.

The hillslope deposits consisted of a single soil profile formed in colluvium derived from the adjacent ridge (Figure III.15). The soil exhibited a moderately developed clayey (Bt) horizon, indicating that it has remained relatively stable for some time. Based on the degree of profile development, the hillslope colluvium is estimated to be middle to late Holocene in age. A layer of highly weathered sandstone bedrock unconformably underlies the soil profile at a depth of about 75 cm. No evidence of buried paleosols and no cultural materials were observed in the trench walls.

The floodplain deposits consisted of a single soil profile formed in alluvium derived mainly from the neighboring stream channel (Figure III.15). The soil exhibits a well-developed clay and calcium-carbonate (Btk) horizon, indicating that it has remained relatively stable for a prolonged period. Based on the degree of profile development, the floodplain alluvium is estimated to be early to middle

Holocene in age. The upper portion of the profile consisted of an over-thickened (cumulic) A horizon that developed as soil formation kept pace with the slow but progressive accumulation of sediment on the floodplain. A few sandstone cobbles of probable cultural origin were observed in the A horizon at a depth of 80 to 125 cm (see Features below). The lower portion of the profile consisted of gleyed, blue-green sand indicative of an anaerobic environment caused by post depositional groundwater saturation. A fragment of unidentified fossil bone was recovered from the gleyed sand at a depth of more than 300 cm. A layer of Upper Cretaceous shale was found to unconformably underlie the soil profile at a depth of 380 cm. No evidence of buried paleosols was observed in the trench walls.

FINDINGS

Site Stratigraphy and Formation Processes

Since this site was associated with a a single bedrock outcrop, there is no information about stratigraphy or site-formation processes that is considered relevant for understanding the nature of CA-CCO-469.

Features

A cultural feature was identified during the clearing of colluvium overlying the northern, downslope end of the bedrock mortar outcrop. The feature included a dense concentration of ash, charred oak bark, and a square-cut nail. Because the accumulation appeared to be of relatively recent origin, no additional recording or sampling was conducted. The nail and bark samples were collected.

Examination of the western wall of Trench 10-4-2 revealed a concentration of sandstone cobbles at a depth of from 80 to 125 cm. The feature consisted of three large sandstone cobbles, resting one on top of another. The backhoe was used to remove overburden and to create an exposure over the feature. The cobbles were exposed by hand using mattocks, shovels, and trowels. Once exposed, the sandstone cobbles were pulled apart and examined. No signs of cultural modification were found. A groundstone fragment, however, was recovered beneath the cobble feature at a depth of 120 cm below surface. This artifact appeared to be the midsection of a sandstone handstone that showed clear polishing and striations on the grinding surfaces. Further excavation of the exposure and intensive examination of the trench profile revealed no additional cultural materials.

Artifact Assemblage

The single handstone fragment was the only portable prehistoric artifact identified at CCO-469.

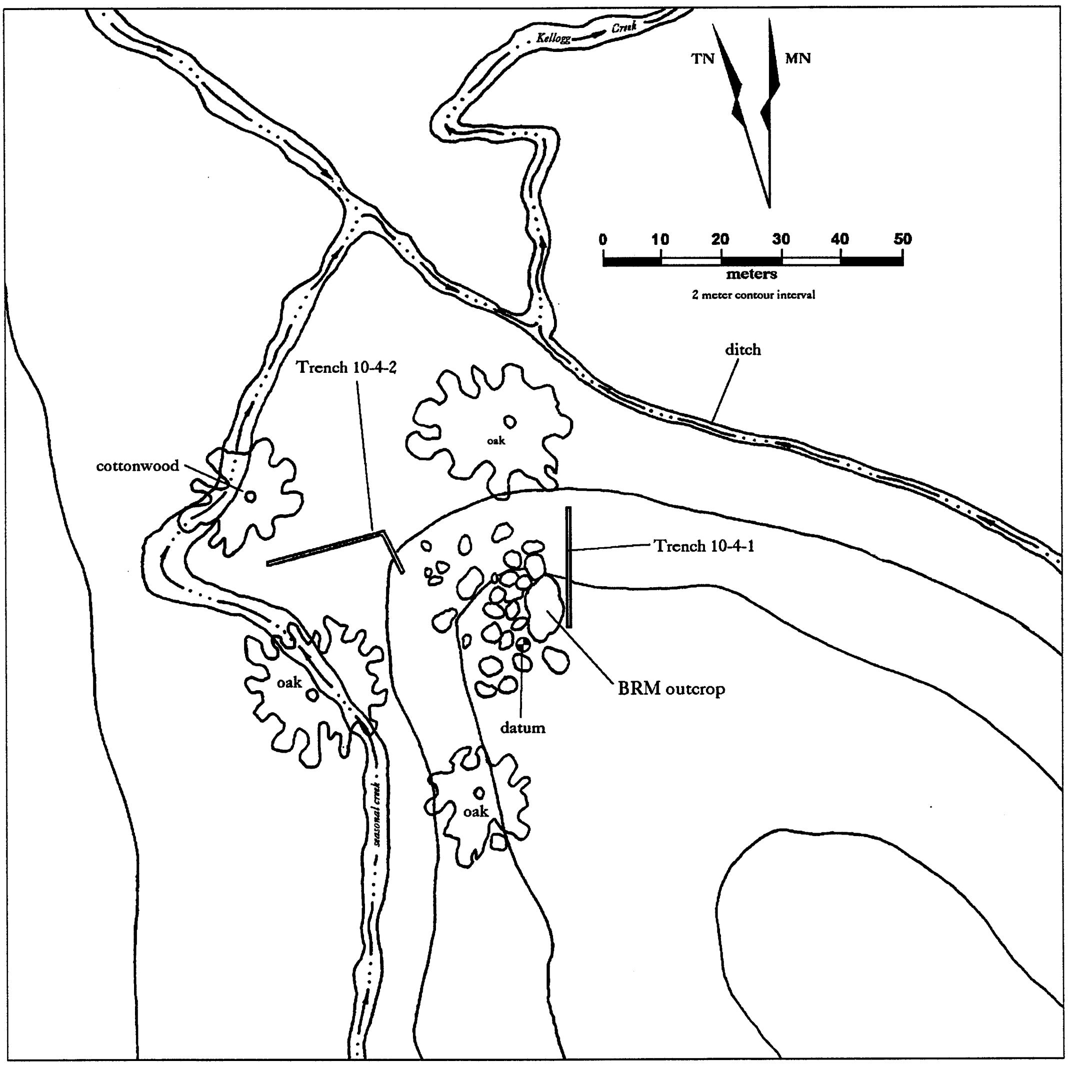


Figure III.14. Site Plan for CA-CCO-469, Los Vaqueros Project

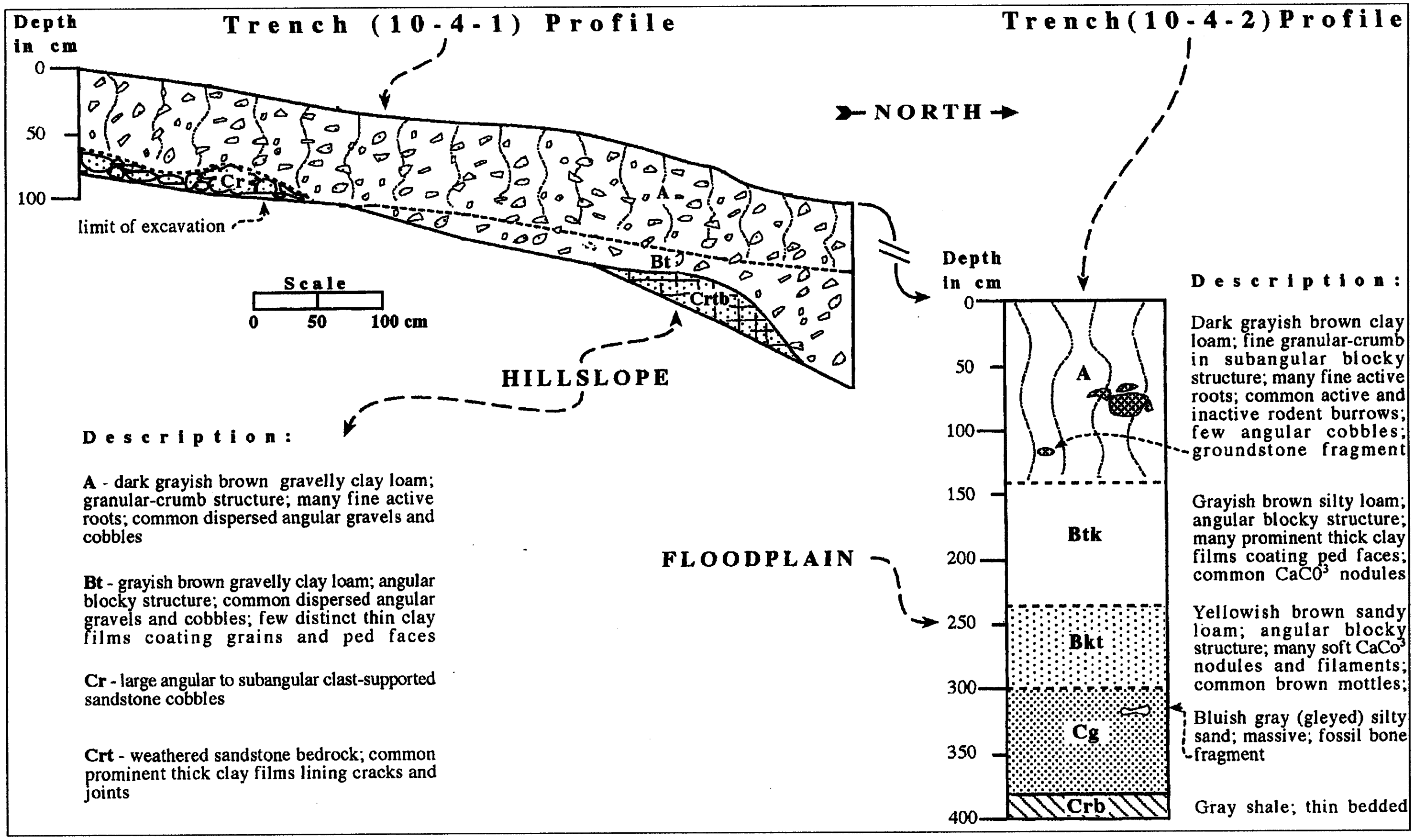


Figure III.15. Profiles, CA-CCO-469

CA-CCO-631

SITE DESCRIPTION

CA-CCO-631—also known as Peat, or the Unimin site—is located at UTM grid coordinates 618960/4189960 (Zone 10), as plotted on the NWIC base map, USGS Byron Hot Springs, Calif., 7.5' quadrangle. The location site was situated at an elevation of 60 feet (approximately 18 meters) AMSL in a small upland valley that drains eastward to the San Joaquin Valley. The closest source of water was an unnamed seasonal creek channel that was located about 50 m east of the site (Figure I.3). A patchy cover of annual grasses was the only vegetation at the site. The resort of Byron Hot Springs is approximately 1200 m southeast of the site location. The site is situated near the recently relocated Vasco Road right-of-way.

As initially recorded, CCO-631 consisted of a scatter of modified lithics that included flakes and tools made of chert, quartzite, and obsidian. Human remains had not been noted when the site was originally recorded. The site was located near an organic-rich deposit of decomposing peat that was thought to mark the location of an ancient bog. It was suggested that the site represented a small temporary camp that may have been used for tool manufacturing.

On 18 September 1994, a wildlife biology team located what appeared to be human bone while working along the right-of-way for the new Vasco Road. ASC archaeologists were called to visit the discovery location and confirmed that (1) the bone was human; (2) the bone represented Native American remains; and (3) the remains represented more than one individual.

An examination of the area revealed that a few formal artifacts and small amounts of flaked stone and heat-altered rock were associated with a tan-colored deposit mixed with a dark-colored peat deposit. The human bone was not stained by the peat deposit, but was about the same color as a tan deposit from which it appeared to have originated. No dietary shell, faunal bone, or other evidence of an occupational nature was observed. It was determined that the artifacts and human remains had been removed from their original context and redeposited in the location where they were discovered.

The investigation concluded that the deposits containing human bone had been inadvertently removed from CCO-631 as part of recent activities of a nearby sand-quarry operation, and were unintentionally stockpiled in the Vasco Road right-of-way.

FIELD WORK

Field work was conducted to recover and remove human remains from the location where the materials were stockpiled. This work was accomplished in a single day using hand rakes and trowels in an effort to expose pieces of human bone and any artifacts. All of the archaeological materials recovered from the stockpile were carefully bagged and transported to storage to await further analysis. (Laboratory work included determination of minimum number of individuals and osteological examination and description of the remains, as requested by the Native American Most Likely Descendants.)

As part of a cooperative agreement, the remaining stockpile of materials were reburied by the sand quarry company while being monitored by an archaeologist and Native American consultants. It was recommended that the company take measures to avoid known site locations in the future.

No further work was conducted at the location due to the lack of archaeological integrity of the stockpiled materials.

FINDINGS

Human Remains

The remains of five adults and two juveniles were recovered from spoils deposited in the Vasco Road right-of-way during quarrying activities at the Unimin sand plant. Most of the remains showed recent fractures resulting from their accidental removal by heavy equipment. The natural preservation of the remains was good to excellent. Despite the fragmentary nature of the remains, all of the major skeletal sections were represented.

CA-CCO-636

SITE DESCRIPTION

CA-CCO-636 was located at UTM grid coordinates 611380/4186100 (Zone 10), as plotted on the NWIC base map, USGS Byron Hot Springs, Calif., 7.5' quadrangle. The site was situated at an elevation of 360 feet (110 m) AMSL on the valley floodplain, at the confluence of the primary southern and western tributaries of Kellogg Creek (Figures III.4, 16). The western edge of the site was bounded by the western tributary, while the eastern portion of the site was bisected by the southern tributary. Most of the site was covered by annual grasses, while several large oaks were distributed along the banks of the drainage channels. The site will be completely inundated by the floodpool of the proposed reservoir.

The site measured approximately 110 m (north-south) x 100 m (east-west) covering an area of 8,639 square meters. CCO-636 was marked by a very sparse accumulation of chert, quartzite, and obsidian flakes. Four hopper mortar slabs, noted in the original site record, were found distributed along a barbed-wire fence that crossed the site northwest to southeast. The mortars displayed numerous scars from agricultural equipment and appeared to have been placed along the fenceline to facilitate cultivation of the adjoining field.

FIELD WORK

The single test phase conducted at CCO-636 included backhoe-trenching, STU, VU, and feature excavation, as well as an intensive surface inspection.

Surface Inspection

An intensive surface examination was conducted in the recorded site area. The surface survey was completed by a team of six archaeologists, who walked transects spaced no more than 10 m apart. Areas of exposed soil, rodent backdirt piles, and sediments exposed in the creek bank were carefully examined. Only 1 chert and 1 quartzite flake were found. Due to the general lack of cultural material identified in the recorded site area, the surface survey was expanded approximately 100 m in all directions. A sparse accumulation of chert and obsidian flakes was identified south of the original site boundary on a small peninsula between the confluence and the east and west channels of Kellogg Creek. A pestle was found east of the main channel near the fenceline.

Following the surface inspection, an arbitrary datum was established and the site was mapped using a standard transit and stadia.

Backhoe-Trenching

Seven test trenches were excavated for archaeological discovery and to examine the subsurface deposits. Four trenches (10-26-1, -3, -4, -5) were created to the north within the original site boundary, two (10-26-2, -6) to the east of the confluence, and one (10-26-7) to the south of the confluence in the newly identified site locus. A large rock feature was uncovered in one of the eastern trenches (10-26-2), while several chert, quartzite, and obsidian flakes and an obsidian arrowpoint were recovered from the southern trench (10-26-7). No archaeological materials were identified in any of the northern trenches. A total of 42 m^3 of deposit were excavated from the trenches.

STU Excavation

A total of 17 STUs were excavated at CCO-636 to identify the subsurface distribution of the cultural deposit recognized during surface inspection. Two northeast-southwest and two northwest-southeast transects were aligned to intersect the previously defined and newly identified site loci. STUs were 1 x 1 m in size, excavated in a single 20-cm contour level, and screened using the 1/4-inch control (dry) method. The units were spaced at 10- or 20-m intervals and identified by distance, in meters, from the main site datum. A total of 3.4 m^3 of deposits were excavated from STUs.

Excavation found that the archaeological deposit was very sparse and that few cultural materials were present in the originally defined site area. A relatively concentrated, albeit sparse, subsurface deposit was identified south of the confluence, confirming the results of surface inspection and backhoe-trenching.

Vertical Unit

Based on the results of STU excavation, a single 1 x 2 m VU was laid out in the area with the highest density of cultural materials (N13/W6). The VU was designed to determine the maximum depth of the cultural deposit and was excavated from 0 to 50 cm in 10-cm contour levels. A total of 0.8 m^3 was excavated from the VU.

Feature Exposure

The backhoe was used to create an exposure, measuring 4 m (east-west) x 5 m (north-south) x 0.5 m deep (10 m^3), over a rock feature identified in Trench 10-26-2. Mechanical excavation was halted just above the feature. Mattocks, shovels and hand-picks were used to remove the remaining overburden, pedestal the feature, and square the exposure walls. Trowels, brooms, and hand-picks were used to clear the feature.

FINDINGS

Site Stratigraphy and Formation Processes

Natural surface deposits at the site consisted primarily of fine-grained alluvial sediments deposited by episodic, overbank floodplain aggradation. Although the chronostratigraphic assignment is tentative, the archaeological remains identified in the East and West Locus of the site were associated with an older floodplain that appears to be an equivalent of the Vaqueros deposit (6355 to 2735 B.P.).

Layers of alternating fine- and coarse-grained sand deposits were found at depths of 1.5 m to 3 m in some areas, indicating that a former stream channel had been buried beneath a younger floodplain on the east side of Kellogg Creek (Figure III.17). No archaeological materials were associated with these channel deposits. Based on the nature of the deposits and the degree of soil formation, the younger floodplain appears to be a chronostratigraphic equivalent of the Brentwood floodplain facies (665 to 250 B.P.).

The history of landscape evolution at CCO-636 can be interpreted from the LSA identified at the site. At this location, it appears that episodic overbank aggradation throughout the middle and late Holocene created a cumulic A horizon within the Vaqueros deposit. Approximately 2,300 to 1,000 years ago, portions of the Vaqueros deposit were eroded by channel incision and stream migration. A meander loop was excavated in the Vaqueros deposit along the east side of Kellogg Creek, which was eventually backfilled by Brentwood deposits. Since then, the Kellogg Creek channel has become entrenched, resulting in floodplain stability and soil formation on the Brentwood and Vaqueros deposits.

Evidence suggests that post-occupational disturbances have affected the systemic context of the archaeological deposits in some portions of the site. Many active and inactive burrows (krotovina), excavated by various ground-dwelling animals, were observed at the surface of the site. Several burrows were noted in the walls of trenches and other excavated exposures. The remains of a possible house floor (Feature 1) illustrate that burrowing activity has disturbed many portions of an otherwise relatively intact archaeological feature (see below). Given these factors, it is likely that some artifacts were displaced from their original systemic context; the spatial and temporal relationships of individual artifacts should be analyzed and interpreted with this in mind.

Feature

A single feature (Feature 1) was recorded at CCO-636, identified in Trench 10-26-2 (Figure III.18). This feature, found at a depth ranging between 30 and 70 cm below surface, was a large, tightly aggregated sandstone concentration, measuring 265 cm (east-west) x 360 cm (north-south). The feature

was composed of hundreds of tabular sandstone cobbles, some water-rounded and some angular, organized into a uniform pavement. The cobbles were all lying flat along the same horizontal plane. The sandstone cobbles ranged in length from 3 to 30 cm and were primarily arranged in a single course, although the cobbles were stacked in some areas. The primary concentration was roughly circular with a smaller, rectangular-shaped, secondary concentration extending from the southwest side. The north side of the primary concentration was bisected by Trench 10-26-2. A large portion along the western edge of the feature was impacted by burrowing, isolating the primary from the secondary concentration (Figure III.18). A large piece (20 x 8 cm) of charred wood was found resting on the rock pavement in the southeast portion of the primary concentration.

The feature was unique among the other rock aggregations identified during the project. Given its size, uniformity, and organization, the pavement is inferred to be a rock-lined floor; the large piece of charred wood probably represented a portion of the superstructure. The outline of Feature 1 (a circle with rectangular extension), is similar to semisubterranean house plans reported by McKern (1923: Figures 3-5).

Three Napa Valley obsidian flakes were collected from the exposure matrix above Feature 1. The obsidian flakes produced mean hydration values of 2.0, 2.1, and 2.4 microns, with a mean of 2.2 microns. A portion of the charred wood was submitted for radiocarbon analysis, returning a date of 1540 cal B.P. A flotation sample collected from the northern portion of the feature (Sample 32) contained primarily manzanita nutlets; 2 pieces of acorn nutshell were also identified.

Artifact Assemblage

A sparse artifact assemblage was recovered from CCO-636, distributed over two primary site loci. Feature 1 was located east of the southern tributary of Kellogg Creek, while the primary concentration of habitation debris was located west of the creek channel. Formal artifacts were limited to a Stockton series projectile point, a biface tip, a cylindrical pestle end-fragment, and 4 small block mortars (Table III.3). The flaked-stone assemblage included a variety of material types dominated by quartzite, chert, and obsidian. Medium and large mammal bone made up the majority of the faunal assemblage.

Chronological Data

Chronological placement was based on a radiocarbon date of 1660 +/- 50, or 1540 cal B.P., from Feature 1. Obsidian-hydration analysis suggests a slightly younger date, with the primary cluster of 6 Napa Valley hydration readings ranging from 2.6 to 1.9 microns (1037 to 554 B.P) and a single outlier at 1.2 microns; 1 Bodie Hills obsidian specimen had a hydration value of 2.6 microns. In addition, a single temporally diagnostic, Stockton Side-Notched projectile point was collected from the site.

Napa Valley obsidian recovered from above Feature 1 in the East Locus of the site produced a mean rim value of 2.2 microns (n=3; sd=0.21); Napa Valley obsidian from the main concentration west of the creek produced a similar mean of 2.1 microns (n=4; sd=0.67). In the absence of more discrete temporal–spatial information, the entire assemblage has been lumped into one late Upper Archaic/Emergent-period component, dated between approximately 1540 and 550 cal B.P.

TABLE III.3
COMPONENT ASSEMBLAGE CA-CCO-636

Flaked Stone	
Small projectile point	
Stockton series	1
Biface	
Tip	1
Cobble tool	
Gabbro	1
Core	
Quartzite	1
Debitage	
Chert	14
Dacite	4
Obsidian	9
Quartzite	14
Siltstone	6
Groundstone	
Small block mortars	4
Cylindrical pestle fragment	1
Faunal	
Mammal/bird bone	55
Freshwater mussel shell	1
Baked Clay	
Lump	1

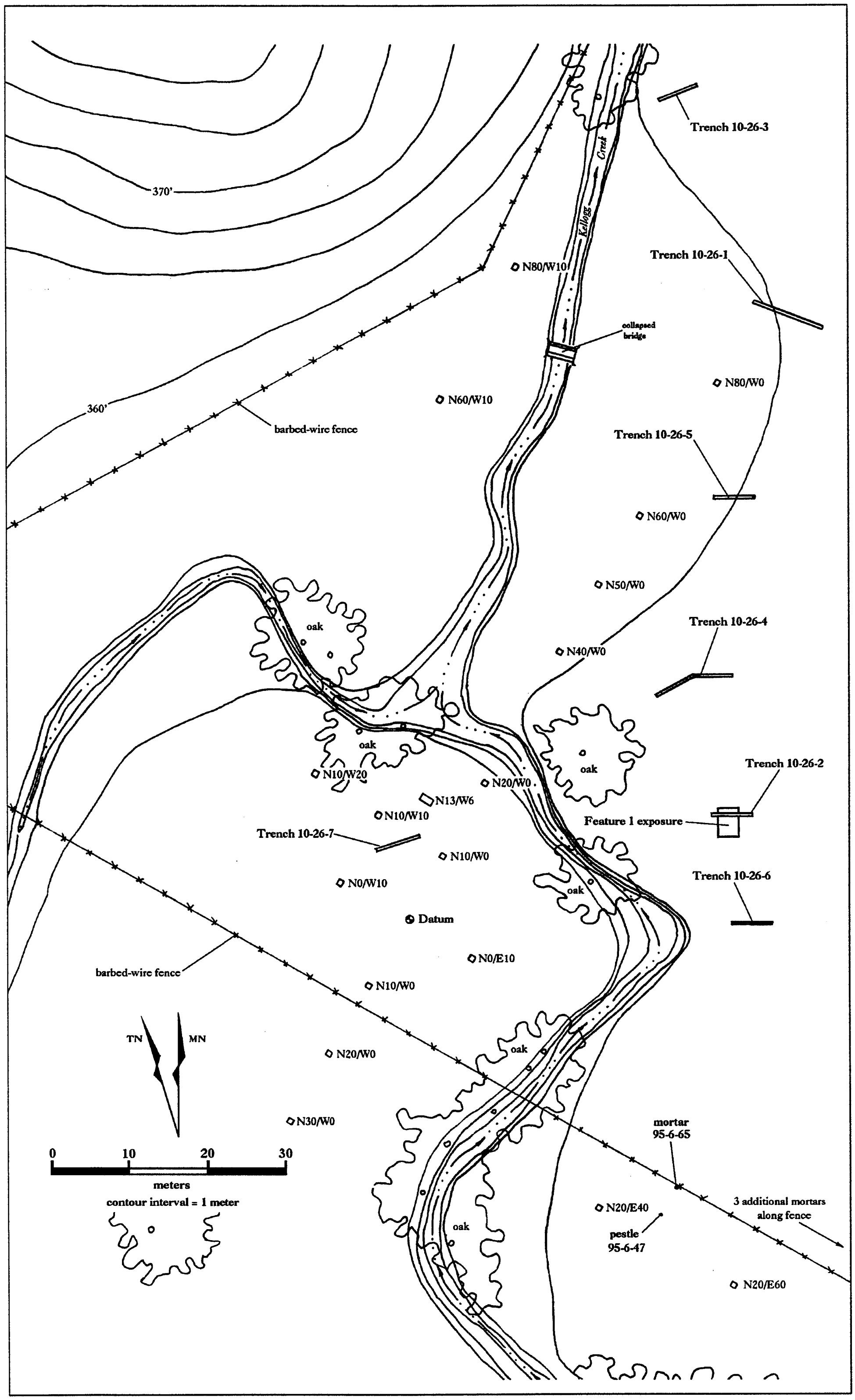


Figure III. 16. Site Plan for CA-CCO-636, Los Vaqueros Project

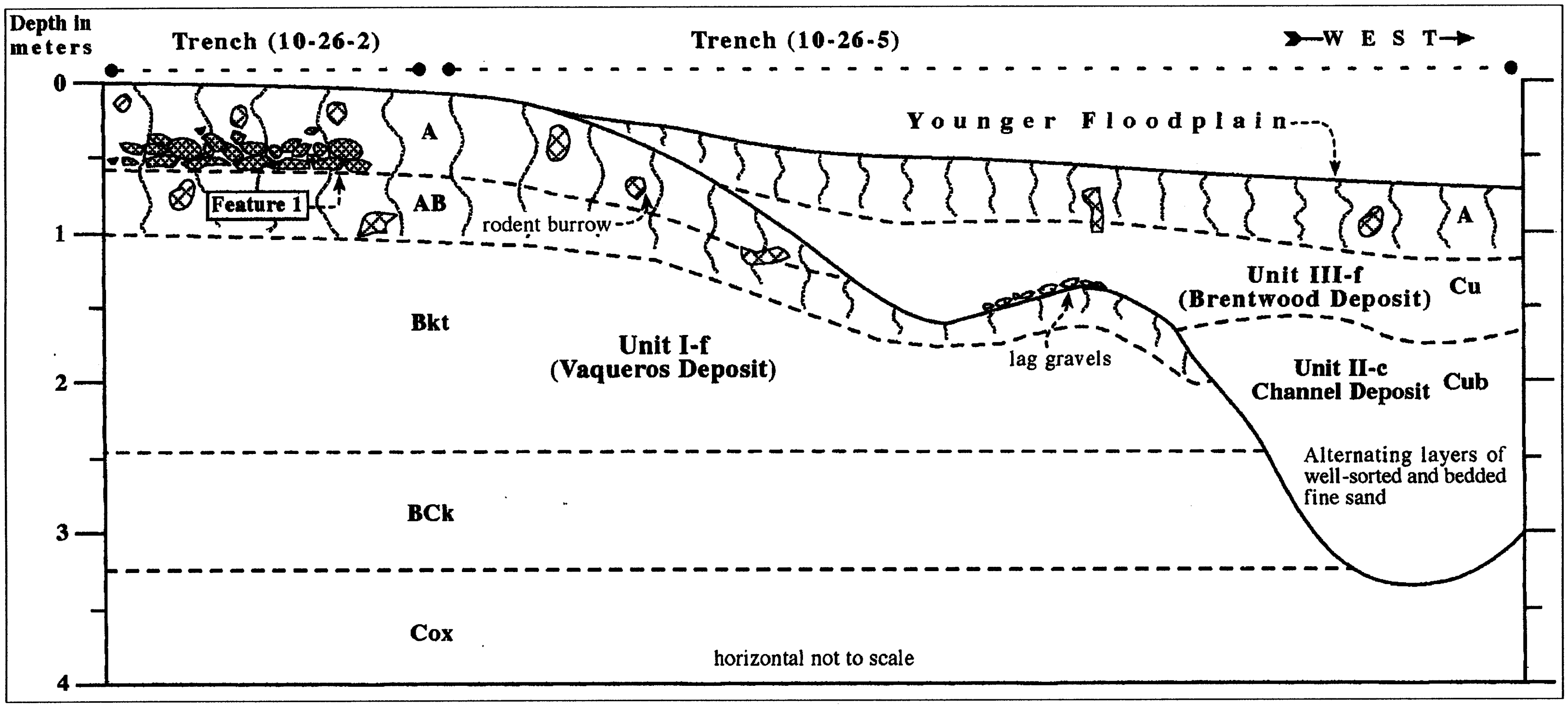


Figure III.17. Profile, CA-CCO-636

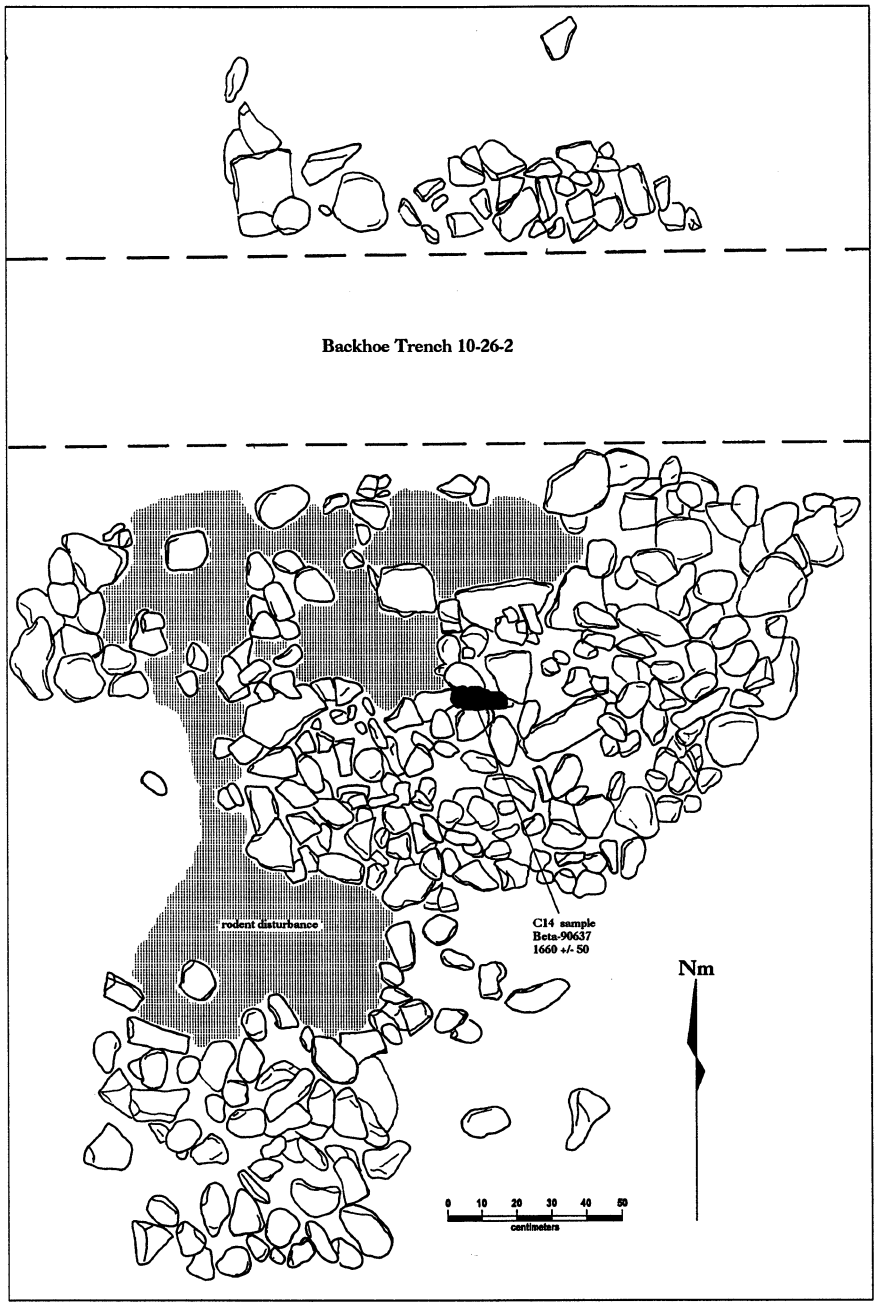


Figure III.18. Feature 1 (a probable rock-lined floor) at CA-CCO-636

CA-CCO-637

SITE DESCRIPTION

CA-CCO-637 is located at UTM grid coordinates 612100/4188440 (Zone 10), as plotted on the NWIC base map, USGS Byron Hot Springs, Calif., 7.5' quadrangle. The site was situated at 310 feet (approximately 94 m) AMSL in a narrow portion of the upper Kellogg Creek valley, within a gently sloping alluvial fan deposit (Figures III.4, 19). The proximal portion of the alluvial fan emerges at a point where a small, seasonal drainage exits the moderate to steep hillslopes that lie west of the site. Prior to reservoir/dam construction, the fan extended three-quarters of the way across the valley before being truncated by the modern Kellogg Creek channel.

Construction of the former Vasco Road and a pair of underground gas pipelines had impacted the site across the medial portion of the fan. Other impacts included construction of modern livestock fence and corral structures and the construction and maintenance of a dirt road through the site. While these activities have clearly affected the deposits at CCO-637, they may have been instrumental in exposing the archaeological materials at the surface, which eventually led to identification of the site. Following mitigation, the area was heavily impacted by excavations for the spillway stilling basin-drainage way, stilling basin drainpipe, transfer pipeline, and other project-related structures.

CCO-637 was originally described as a sparse surface accumulation of shell and stone flaking debris. The site was recorded south of the alluvial fan, between the hillslope and Kellogg Creek. Field investigation determined that the archaeological deposit was associated with a buried soil that extended throughout the alluvial fan, including a large area outside the Area of Direct Impact of the dam and reservoir construction. Based on these results, the site boundaries were adjusted to include the entire fan area. The total site area measured approximately 90 m (north-south) x 180 m (east-west), for a total of 12,723 square meters.

FIELD WORK

Field work at CCO-637 was conducted in three phases. The exploratory phase included site mapping, surface inspection, backhoe-trenching, and VU excavation. The second phase included excavation of STUs and area exposure. The final phase involved archaeological monitoring of the dam-construction grading.

Surface Inspection

The entire alluvial fan and recorded site area were intensively surveyed by a team of three archaeologists. All rodent backdirt piles and other areas of exposed soil were carefully examined. The surface inspection revealed only a few pieces of obsidian and chert flaking debris. No cultural materials were identified in the recorded site area. Construction of the former Vasco Road had created a 150-cm deep exposure that bisected the alluvial fan north-south. Examination of the west side of the roadcut revealed a buried soil horizon at approximately 90 cm below the surface. The paleosol was found to contain cultural materials, including concentrations of charcoal, heat-affected sandstone, burnt and unburnt dietary bone fragments, and chert and quartzite flaking debris. A hearth feature (Feature 1) was also identified in the profile. Cultural materials were found to be distributed throughout the central portion of the fan.

Roadcut Profile

The roadcut located west of the former Vasco Road was examined for archaeological materials and to determine the nature and extent of the subsurface deposits. A 60-m-long section of the medial alluvial fan deposits at this location was documented and sampled in the field as the Roadcut Profile.

Two allostratigraphic units were identified in the Roadcut Profile, as shown in Figure III.20. The lower unit consisted of floodplain alluvium that exhibited a moderately developed (Ab/Bktjb) soil

profile, representing a buried paleosol. The upper unit consisted of floodplain alluvium that exhibited a weakly developed (A/C) soil profile, formed at or near the existing ground surface. Several pieces of heat-affected rock and culturally modified flaked stone were found in the buried paleosol at depths that ranged from 60 cm to 135 cm below the surface. A concentration of baked clay (Feature 1) and a nearly continuous layer of sandstone rocks were noted at a depth of about 100 cm below the surface. A radiocarbon age of 2585 cal B.P. was later obtained for Feature 1.

Backhoe-Trenching

A total of 30 test trenches were excavated in the fan for archaeological discovery and to examine subsurface deposits (Figure III.19). Twenty-eight trenches were excavated west of former Vasco Road: 19 in the proximal portion of the fan (Trenches 4-25-1 to -10, 4-26-1 to -9); and 10 in the medial portion of the fan (Trenches 4-25-11, 4-26-10 to -14, 4-27-2 to -4). Two trenches were excavated to the east of the road in the distal portion of the fan (8-10-2 and -3). One trench was excavated for the purpose of a subsurface transect in the medial portion of the fan (4-27-1; see below). In compliance with PG&E safety recommendations, trenches were not excavated within 6 m on either side of the pair of the buried pipelines that bisected the medial portion of the fan.

The trenches revealed that the upper 200 cm of the fan deposit was composed of the same alluvial floodplain deposits as those identified in the Roadcut Profile (see above). A deeper, but poorly defined, buried paleosol was observed in some trenches at a depth of more than 200 cm below the surface. Buried archaeological materials were identified in several of the trenches in association with the buried paleosol (Unit 1-Ab). A layer of heat-affected rocks was consistently found at a depth of 100 to 150 cm below the surface in the proximal and medial portions of the fan. A shaped pestle fragment (95-7-364) was recovered from Trench 4-25-6 at a depth of 150 cm below the surface. The recovery of one basalt flake (95-7-292) from a depth of about 300 cm (Trench 4-26-1) suggested that more deeply buried archaeological materials might be present at the site. A layer of heat-affected rock, noted at 60 cm in the distal portion of the fan (Trench 8-10-2), demonstrated that the archaeological deposit extended east of the former Vasco Road. A total of 267 m^3 of site matrix were excavated from subsurface test trenches at the site.

Test Excavation (TUs)

Based on the results of backhoe-trenching at CCO-637 and examination of the Roadcut Profile, cultural material was identified in a paleosol buried by 60 to 90 cm of sediment. A transect of exploratory TUs was excavated to identify the nature and extent of the archaeological deposit. A datum was established at the northeast corner of the corral; TUs were laid out at 10-m intervals south of the datum. The initial TU (S10/W0) measured 1 x 2 m and was hand-excavated in arbitrary 10-cm contour levels. Beginning with the 40- to 50-cm level, the unit size was decreased to 0.5 x 2 m. Unit S10/W0 was excavated to a maximum depth of 80 cm and recovered only one chert flake. To speed the sampling process, subsequent TUs measured 0.5 x 2 m. Unit S20/W0 was excavated from surface to 100 cm in arbitrary 20-cm intervals, while unit S50/W0 was excavated by removing the first 40 cm in a single level. The following levels were excavated in 10-cm intervals. Arbitrary excavation was halted after a human burial (Burial 1) was encountered in the 70- to 80-cm level. The unit was subsequently enlarged in order to expose and remove the burial. A total of 2.6 m^3 of matrix were excavated from TUs.

Subsurface Transect Units

TU excavation revealed that the paleosol was buried by approximately 60 cm of culturally sterile alluvium in the medial portion of the fan. Increased recovery of cultural materials, beginning with the 60-cm level, confirmed that the archaeological deposit was associated with this stratum. TU excavation, however, proved to be relatively unproductive given the amount of time invested and the narrow area sampled. To gain a broader sample of the archaeological deposit, a more expedient sampling method was devised.

A backhoe was used to remove approximately 18.0 m^3 of culturally sterile soil and sediment overlying the archaeological deposit for a distance of approximately 50 m, north to south, across the alluvial fan. Guided by the project geoarchaeologist, trenching was halted at the contact between the upper soil and the buried paleosol, approximately 60 cm below surface. Once the buried paleosol was exposed, the trench (4-27-1) was segmented into 4-m-long by 0.6-m-wide units. Subsurface Transect Units (SSTUs) were excavated along the W1 grid line and identified by their distance, in meters south, from the grid datum established during TU excavation. At Unit S46/W1 the trench angled 10 degrees west of south (grid-south) to conform with the natural topography of the alluvial fan.

Beginning at the north end of the trench, units were excavated in one 20-cm-deep level with the backhoe. The 1/4-inch megascreen was positioned alongside the trench and the backhoe bucket used to deliver unit matrix to the top of the screen. A team of three screeners moderated the flow of soil and culled all identified cultural material. Trench spoils were screened only once. The megascreen was regularly repositioned to keep pace with the advancing backhoe excavation and to avoid the accumulated screen residue.

Nine units (S18/W1-S50/W1) comprising 36 m of trench were excavated in this manner. All cultural materials recovered from SSTUs were recorded and the results used to identify the most productive area for further controlled excavation. Units S26/W1-S34/W1 were found to have the highest concentration of habitation debris and tools. A baked-clay hearth (Feature 2) was recorded in Unit S34/W1. A total of 4.32 m^3 of site matrix were sampled using SSTUs.

Area Exposure Excavation

A backhoe was used to create a 2 x 8 x 0.6-m excavation to expose the portion of the paleosol found to contain the highest concentration of cultural materials (S26-S34). Approximately 11.2 m^3 of culturally sterile sediment were removed mechanically, then the side walls of the exposure were straightened and the floor leveled using hand tools. A block composed of four contiguous 1 x 2 m units was laid out on the paleosol. The units were arranged end to end, oriented north to south, along the (W3) grid line, creating a 8-m-long exposure, 1 m in width. Each unit was identified by distance, in meters south, from the grid datum (S27/W3-S33/W3). An arbitrary sub-datum was established, at surface level, next to the northwest corner of the backhoe exposure, and the initial depths of each unit were recorded. All units were leveled to 70 cm below the sub-datum. Units were excavated in arbitrary 10-cm levels and screened using the 1/4-inch control (dry) recovery method. To allow concurrent exposure of buried surfaces and widespread features, the same level in each unit was excavated before the next level was started. The exposure was excavated to a minimum depth of 130 cm below surface (b.s.) in the southernmost unit (S33/W3) and to a maximum depth of 150 cm b.s. in the northernmost unit (S27/W3). A total of 5.6 m^3 of site matrix were excavated from AEUs.

Examination of the AEU walls revealed the same soil stratigraphy found elsewhere at the site (Figure III.21). The lower portion consisted of a moderately developed (2Ab/Bktjb) soil profile formed in floodplain alluvium that represented a buried paleosol. The upper portion consisted of a weakly developed (A/C) soil profile that formed in floodplain alluvium at or near the existing ground surface. No prehistoric archaeological materials were identified in the upper A/C horizons. These were, however, concentrations of sandstone rocks representing cultural features associated with the buried paleosol (Ab) between 75 and 120 cm below the surface. Cultural materials were also observed in a few of the many rodent burrows that penetrated below 120 cm into the ABktb horizon. Another possible buried paleosol (Ab) was identified at a depth of more than 220 cm in a hand-auger hole excavated in the base of unit S27/W3. Pieces of dispersed charcoal were noted in the possible buried paleosol.

Construction Monitoring

Monitoring of construction excavations was undertaken to recover any additional human graves that might be exposed by heavy equipment. All excavation at CCO-637 was monitored by a team of two or three archaeologists and a Native American representative. Major construction-related impacts to the

site have included the excavation for the spillway stilling basin and drainage way. The excavation for the stilling basin structure was undertaken in a part of the fan that was not tested by archaeological excavations due to the presence of two buried gas pipelines.

At the request of a Native American Most Likely Descendant, paddle-wheel scrapers were used to excavate the stilling basin and a portion of the drainage way. Each pass of the scraper was carefully examined for human burials and artifacts. A 5-m buffer zone was established around human remains as they were encountered, which allowed scraping to continue in other areas. All in-situ artifacts and burials found during monitoring were recorded with reference to one of two datums (M3, M4) established along a barbed-wire fence west of former Vasco Road. Human remains were carefully excavated and placed in a secured storage facility prior to removal to the ASC Collection Facility for analysis. As of October 1997, an additional 23 human burials (24 total), several artifacts, and one feature had been identified at the site. Only 18 burials from CCO-637 are reported on in this volume; a supplemental report will be prepared after construction is completed.

FINDINGS

Site Stratigraphy and Formation Processes

Natural deposits at CCO-637 consist of fine-grained alluvial deposits derived from a small channel that drains the hillslopes west of the site. The relatively slow but steady accumulation of these deposits that the base of the hillslopes created an alluvial fan that spreads out toward Kellogg Creek to the east. Two distinct stratigraphic units, each with some degree of soil development, were identified at the site. Indications of a third, but poorly defined, unit were found in some locations at the site.

Surface deposits (Unit II) at the site exhibited a weakly developed soil profile similar to that identified elsewhere as the Brentwood floodplain facies (665 to 250 B.P.). Most of the archaeological remains at the site were found at depths of 70 to 130 cm, in association with a buried paleosol identified as the Ab horizon of Unit I. Although no stratigraphic break was identified within Unit I, cultural materials were found to occur in two primary zones. In the area exposure, higher densities of cultural materials were identified above and below the 100- to 110-cm level, which to coincide with the vertical distribution of cultural features found in the exposure. Human burials were also found to occur in two general stratigraphic levels, those above 120 cm and those below 145 cm. These distribution patterns suggest that there was a certain amount of vertical separation present within the Unit I deposit. Unit I appears to represent a chronostratigraphic equivalent of the Vaqueros deposit (6355 to 2735 B.P.).

In addition, a possible paleosol (containing many pieces of charcoal) was observed in some parts of the site at depths of 200 to 225 cm, suggesting the presence of a deeper, but poorly defined, stratigraphic unit. This is further supported by the discovery of a few archaeological remains, including human burials, at depths of more than 200 cm, in association with a deposit containing many pieces of charcoal. Finally, the discovery of extinct terrestrial mammal remains (probable camel; see Appendix B) indicates that the deepest deposits within the fan are at least late Pleistocene in age.

The history of landscape evolution at CCO-637 can be interpreted from the LSA identified at the site. Beginning in the late Pleistocene, alluvium began to accumulate slowly but steadily at the base of the hillslopes, producing an alluvial fan deposit. As soil formation kept pace with deposition throughout most of the Holocene, an over-thickened cumulic A horizon was formed within Unit I. Prehistoric occupation of the site appears to have begun in the middle Holocene, but continued well into the late Holocene during the formation of Unit I. Sometime between 665 and 250 B.P., the surface of Unit I was buried by the relatively rapid accumulation of alluvium representing Unit II.

Evidence indicates that post-occupational disturbances have affected the systemic context of the archaeological deposits in some portions of CCO-637. Many active and inactive burrows (krotovina), excavated by various ground-dwelling animals, were observed at the surface of the site, and many burrows were noted in the walls of trenches and the other excavated exposures. A profile of the AEU's west wall illustrates that burrowing activity has disturbed many parts of the site matrix. Given these factors, it is likely that some artifacts were displaced from their original systemic context.

Burials

Human remains representing a total of 18 individuals were recovered from Soil Unit I, including 1 encountered during VU excavation, and 17 during monitored site grading. Two distinct concentrations of burials were identified, separated vertically by approximately 25 cm of alluvium. The burials were distributed between two zones coinciding with the A and B horizons of Soil Unit I. The upper zone ranged from 86 to 122 cm below surface and included 8 burials, the majority of which were highly disturbed. Both of the 2 for which a burial position could be determined were tightly flexed. Burial orientation, recorded for only 3 individuals, was primarily toward the southwest quadrant, ranging from 180 to 280 degrees (magnetic north). Two burials from the upper zone had artifact associations (a lump of iron oxide and a *Haliotis* shell fragment.).

Ten burials were contained in the lower zone, which ranged from 145 to 221 cm below surface. A variety of burial positions were recorded, including 2 tightly flexed, 2 loosely flexed, 2 semi-extended, and 3 extended; the position of 1 individual could not be determined. In contrast to burials from the upper concentration, all of the deeper burials were oriented towards the northwest quadrant, from 270 to 357 degrees (magnetic north).

Artifacts were associated with three of the deeper burials. Red ochre and *Olivella* beads were found with Burial 14. Along with the pigment, a thin, concentrated, lens of charcoal was identified directly below the skeletal remains, interpreted as evidence for a preinterment fire. A sample of charcoal collected from this lens produced a radiocarbon date of 4770 cal B.P. Three side-notched projectile points were recovered with two other burials. A complete chert point was found with Burial 5 and a complete chert point and a point base of a Napa Valley obsidian was associated with Burial 7. Large concentrations of charcoal were identified in the matrices of Burial 5 and Burial 7, although no distinct lens was recognized. Samples of charcoal from both burials were submitted for radiocarbon dating, resulting in dates of 4950 +/- 90 and 5090 +/-80, or 5665 and 5795 cal B.P. respectively.

Hydration readings were obtained from a projectile point and a biface fragment associated with Burial 7. Both specimens produced identical rim values of 3.0 microns (1380 B.P.). These hydration readings conflict with the radiocarbon date also associated with Burial 7. Although the hydration dates may call into question the radiocarbon date, there are two primary reasons to believe that the hydration results may be in error: (1) Burial 7, located almost 2 meters below the surface, was one of the deepest interments found at the site; and (2) a similar radiocarbon date was obtained from Burial 5, also associated with a side-notched projectile point.

Features

A total of seven features were formally identified at CCO-637, including one rock hearth, two baked-soil hearths, and four refuse scatters. One formal feature was recorded during monitored grading, one was identified during road-cut examination, one was found in SSTU excavation, and four were recorded in the area exposure. Monitored grading at the site revealed additional loose aggregations of fire-affected sandstone: these were not formally recorded.

Feature 1: Baked-Soil Hearth

This hearth feature, located in the Ab horizon of Soil Unit I, was identified in the Roadcut Profile between 90 and 110 cm below surface. The feature was a 30-cm-thick, dish-shaped lens of baked soil, approximately 100 cm in diameter. While the top of the feature was clearly defined, a gradual transition occurred between the lower portion of the feature and the underlying soil, indicating that the fire-alteration had occurred in situ. The baked-soil matrix contained concentrations of charcoal, several pieces of calcined bone, traces of freshwater mussel shell, and quartzite and chert flakes. Fish remains were also identified, including Sacramento perch and unidentified minnow. A flotation sample (Sample 53) collected from the feature matrix contained a high frequency of acorn and manzanita, as well as lesser amounts of other small seeds and nuts.

Feature 2: Baked-Soil Hearth

Identified between 70 and 85 cm below surface in SSTU S34/W1, this feature appeared to be a hearth. The feature, located in the Ab horizon of Soil Unit I, was a discrete area of baked soil measuring approximately 80 cm in diameter. The baked soil formed a 5- to 11-cm-thick lens that gradually dissipated from top to bottom, indicating that the fire-alteration had occurred in situ. Fish remains from the matrix included Sacramento perch and an unidentified fragment. A flotation sample (Sample 58) collected from the feature contained a high frequency of manzanita and acorn, as well as, several other types of nut fragments; virtually no small seeds were collected from the feature matrix.

Feature 3: Refuse Scatter

This feature, identified in AEU S29/W3 and S31/W3 between 79 and 92 cm below surface, was a scatter of fire-affected sandstone cobbles. Located in the Ab horizon of Unit I, Feature 3 consisted of 50+ sandstone cobbles, 3 to 35 cm in length, tightly clustered near the center of the concentration and more widespread along the margins. The cobbles were resting on a horizontal plane with the eastern and western edges of the feature extending into the unexcavated side walls of the exposure. A pestle (95-7-198), found 90 cm below surface, was located approximately 50 cm south of the feature in S31/W3. Based on the widespread distribution and lack of organization, the feature appeared to be a refuse scatter distributed along an occupation surface. A flotation sample collected from within the tight cluster of cobbles at the center of the feature contained manzanita, acorn, wild cucumber, and bay. Virtually no small seeds were recovered.

Feature 4: Refuse Scatter

Identified in AEU S33/W3 between 90 and 100 cm below surface, a scatter including discrete lumps of baked soil and fire-affected sandstone cobbles was designated Feature 4. Seven large lumps of baked soil, ranging in length between 4 and 20 cm, were mixed with five sandstone cobbles ranging in size between 10 and 20 cm. The loose aggregation of materials, measuring 75 cm (north-south) x 50 cm (east-west), was resting on a horizontal plane. The baked soil was found in individual lumps, indicating that it was fire-altered elsewhere. No grass or other impressions was identified within the baked soil. A pestle fragment (95-7-249) was found at 90 cm below surface, approximately 25 cm southwest of the feature. The distribution of these materials indicated that they were refuse discarded on an occupation surface. A flotation sample (Sample 63) collected from matrix within and below the scatter of material contained fish remains, including Sacramento perch and unidentified minnow. Plant macrofossils included manzanita, acorn, wild cucumber, bay, and small amounts of farewell-to-spring and goosefoot.

Feature 5: Refuse Scatter

A widespread scatter of 80+ fire-affected and unaltered sandstone cobbles located in S31/W3 and S33/W3, between 100 and 130 cm below surface, was designated Feature 5. Identified at the A/B horizon transition of Soil Unit I, the feature measured 240 cm north-south and covered the entire 1-meter-wide exposure, extending into the east and west walls of the units. The sandstone cobbles, ranging in length between 3 and 50 cm, were tightly clustered along the western wall of the unit and more loosely distributed to the south and east. The feature was resting on a relatively horizontal plane. Fish remains collected from feature matrix included Sacramento perch and unidentified minnow. A flotation sample taken from within and below the tight cluster of rocks along the western edge of unit S33/W3 contained primarily large taxa, including acorn, manzanita, wild cucumber, bay, and Coulter pine.

Feature 6: Refuse Scatter

This feature, identified in the northern half of S27/W3 between 99 and 117 cm below surface, consisted of a scatter of 30+ unaltered and fire-affected sandstone cobbles. Located at the A/B horizon of Soil Unit I, the scatter of cobbles was distributed along a horizontal plane, extending into the eastern, western, and northern sidewalls of the exposure. The sandstone cobbles ranged in length from 2 to 23 cm and were tightly clustered along the southeastern and southwestern edges of the unit. A pestle (95-7-365) was found in the northwest corner of the feature and numerous charcoal flecks were noted in the feature matrix.

Feature 7: Rock Hearth

Feature 7, identified during monitored grading at the site, was located 84 cm below surface at a bearing of S71°W, 22 m from Datum M-3. The roughly circular feature consisted of a tight, organized cluster of 50+ fire-affected sandstone cobbles, measuring approximately 100 cm in diameter. The cobbles, ranging in length from 4 to 20 cm, formed a single course resting on a roughly horizontal plane. A pestle (95-7-394) was found adjacent to the west side of the rock concentration. The organization of the feature indicated that it was probably constructed as a hearth or similar cooking facility.

Feature Distribution

Features identified at CCO-637 appeared to be distributed between two stratigraphic zones within the A horizon of Unit I. The vertical separation between features was most clearly distinguished in the area exposure (Figure III.22). Features associated with the upper zone were found at maximum depths of 100 cm below surface or less, including Features 3 and 4. Those associated with the lower zone included Features 5 and 6, found at maximum depths ranging from 117 to 130 cm below surface. Based on their maximum depths and vertical positions within Soil Unit I, Features 1, 2, and 7 (found outside of the hand-excavated exposure) appear to be part of the upper zone. The vertical distribution of features corresponds well with the higher densities of cultural material above and below the 100- to 110-cm level in the AEU, indicating that two general habitation layers were present in the deposit.

Artifact Assemblage

Flaked Stone

Flaked-stone artifacts from CCO-637 include debitage, projectile points, bifaces, cobble tools, core tools, cores, and large modified flakes (Table III.4). The projectile points were predominantly side-notched forms associated with burials, although one expanding stem and one leaf-haped point was collected during hand excavation and monitored grading. Three of the 5 projectile points are chert, 1 is Napa Valley, and 1 is Annadel obsidian.

Judging from the high degree of pressure flaking, the majority of bifaces from the site appear to be projectile-point fragments. In contrast to the diagnostic projectile points, the bifaces are predominantly Napa Valley obsidian with only 2 chert specimens represented.

Cores were the most numerous of the flaked-stone artifacts. Roughly half of the cores (n=10) were multidirectionally flaked, while the other half had been worked unidirectionally. The majority of specimens were siltstone, chert, and quartzite. Of the 10 non-siltstone specimens, 7 retained patches of cobble cortex, indicating that they derived from river/stream cobbles. In addition, two cores and one split cobble exhibited heavily crushed margins and or flake facets, suggesting that they had been used as tools.

Consistent with the frequency of core material, flaked-stone debitage from the site was dominated by chert (39%), siltstone (31%), and quartzite (11%). Obsidian made up only 9% of the assemblage. Despite the high frequency of cores at the site, only 2 modified flakes were collected, suggesting that perhaps such tools were discarded offsite.

Groundstone

The majority of groundstone artifacts are pestles, including shaped and unshaped specimens. Only 3 mortars were recovered from the site. Pestles are made of two material types: sandstone (n=9); and graywacke (n=4). Four specimens have use-wear on opposing ends, while 6 specimens are single-ended. Pestle use resulted in four primary end shapes, including convex parabolic (36%), slightly convex (36%), flat (21%) and convex (7%). In addition to the use-wear recorded on the pestle ends, slightly more than half of the specimens from the site (n=7), had pecking scars and extensive use-wear polish on the sides. These additional wear patterns indicate that such implements may have been used for a variety of processing activities.

Marine Shell Beads and Ornaments

The vast majority of shell beads from CCO-637 were recovered in association with Burial 14. These included *Olivella* End-Ground, Spire-Lopped, and Thick Rectangular beads. Fourteen small *Olivella* Spire-Lopped beads (Type A1a) were collected during excavation of the area exposure. Four of the beads occurred between 90 and 110 cm and 10 occurred between 120 and 140 cm. A single piece of *Haliotis* shell, possibly an ornament fragment, was found with Burial 9.

Baked Clay

In addition to the baked-clay hearth features, several isolated lumps of baked clay were collected from SSTU and AEU excavation. Slightly over 40% of the baked-clay pieces exhibited grass and/or other unidentified impressions. These specimens are similar to daub fragments found at other sites.

Faunal Bone

The faunal assemblage from CCO-637 is dominated by large (46%) and medium-size mammal bone (36%). Small mammal (18%) and bird bone (0.3%) make up roughly 20% of the collection. Identified fish remains from the site are limited to two resident freshwater species (Sacramento perch and Sacramento squawfish).

Faunal Shell

Several pieces of freshwater mussel shell were collected while many more were observed during site grading. Only one specimen could be identified as *Gonidea angulata*.

Chronological Data

Radiocarbon Dates

A total of four radiocarbon dates were obtained from CCO-637. Charcoal samples were collected from three deeply buried burials (Burial 5, 7, and 14). These samples produced radiocarbon dates ranging from 5795 to 4770 cal B.P. A fourth date of 2585 cal B.P., associated with the upper habitation zone, was obtained from a baked-clay hearth, Feature 1.

Obsidian Hydration

A total 64 obsidian specimens were submitted for hydration analysis, producing 59 usable hydration readings. The sample was made up of four different obsidian sources (Napa Valley, Bodie Hills, Annadel, and Casa Diablo); the majority were Napa Valley (80%). Hydration readings from the Napa Valley obsidian ranged from 4.7 to 1.3 microns (3388 to 260 B.P.); Bodie Hills ranged from 3.6 to 1.9 microns; and Annadel and Casa Diablo specimens produced rim values of 1.4 and 2.6 microns respectively. Obsidian-hydration readings from the area exposure were analyzed by depth, revealing no significant patterning.

Shell Beads

The combination of shell-bead types recovered from the site is diagnostic of the Middle Archaic period (Bennyhoff and Hughes 1987: Scheme B1). A radiocarbon date associated with the beads from Burial 14 is consistent with this chronological placement.

Summary of Chronological Data

Radiocarbon dates and temporally diagnostic shell beads indicate that CCO-637 was occupied during the Middle Archaic period (ca. 6000 to 2500 B.P. The obsidian-hydration readings, however, were primarily at odds with these other chronological data. Despite several rim values indicating Middle Archaic occupation, the majority of the hydration readings dated to the Upper Archaic and Emergent periods (post 2500 B.P.). These results suggest that, while the primary site features date to the Middle Archaic, sporadic use of CCO-637 probably extended into the Emergent period, and that relatively little obsidian use occurred during the primary occupation.

TABLE III.4
COMPONENT ASSEMBLAGE CA-CCO-637

Flaked Stone				
	Large projectile points			
		Leaf shaped		1
		Expanding stem		1
		Side notched		3
	Bifaces			
		End		1
		Margin		2
		Midsection		1
		Tip		2
	Large modified flakes			
		Siltstone		2
	Cobble tool			
		Quartzite		1
	Core tools			
		Quartzite		1
		Petrified wood		1
	Cores			
		Basalt		1
		Chert		4
		Siltstone		9
		Quartzite		4
		Dacite		1
	Debitage			
		Nonobsidian		
			Basalt	38
			Chert	262
			Dacite	5
			Granite	2
			Hornfels	10
			Petrified wood	7
			Quartz	4
			Quartzite	76
			Rhyolite	2
			Siltstone	205
			Slate	1
			Soapstone	1
		Obsidian		
			Annadel	2
			Bodie Hills	10
			Napa Valley	51
Groundstone				
	Mortars			
		Large bowl mortar		1
		Unique block mortar		1
		Mortar fragment		1
	Pestles			
		Cylindrical		4
		Slightly shaped		3
		Conical		1
		Cobble		3
		Indeterminate		2
	Battered cobble			
		Chert		1
		Basalt		1
	Siltstone			1
Minerals				
	Iron oxide			present
Fossil				
	Oyster-shell fragments			present
Modified Bone				
		Curved-to-flat		1
Shell Beads				
	Olivella			
		Spire-Lopped		571
		End Ground		113
		Thick Rectangle		501
		Fragments		73
Faunal				
	Mammal/bird bone			1,200
	Freshwater mussel shell			39
Baked Clay				
	Impressed			16
	Lumps			21

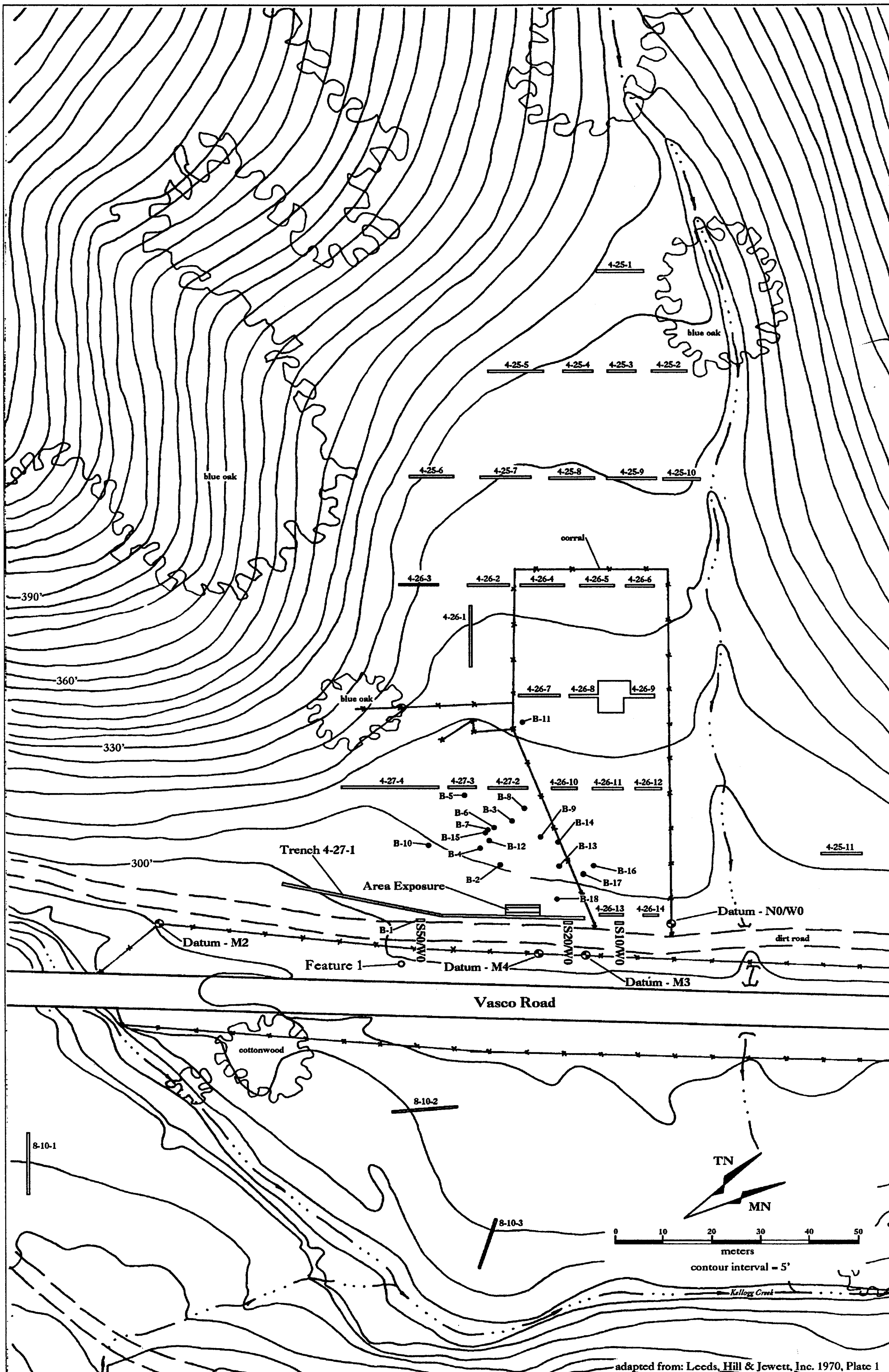
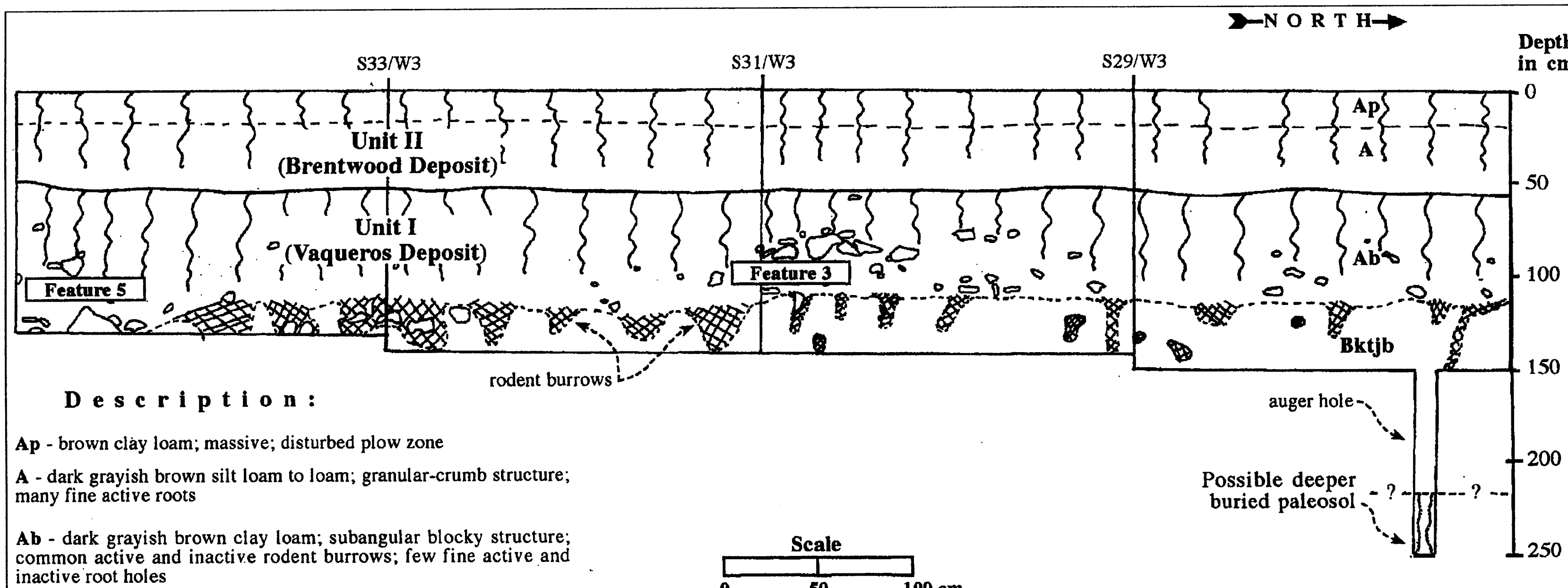


Figure III.19. Site Plan for CA-CCO-637, Los Vaqueros Project



Description:

Ap - brown clay loam; massive; disturbed plow zone

A - dark grayish brown silt loam to loam; granular-crumb structure; many fine active roots

Ab - dark grayish brown clay loam; subangular blocky structure; common active and inactive rodent burrows; few fine active and inactive root holes

Bktjb - brown loam; subangular blocky structure; common powdery $CaCo^3$ filaments and < 25% stage II nodules; common active and inactive rodent burrows; common fine inactive root holes; few faint thin clay films coating and bridging grains

Figure III.20. Area Exposure Profile at CA-CCO-637

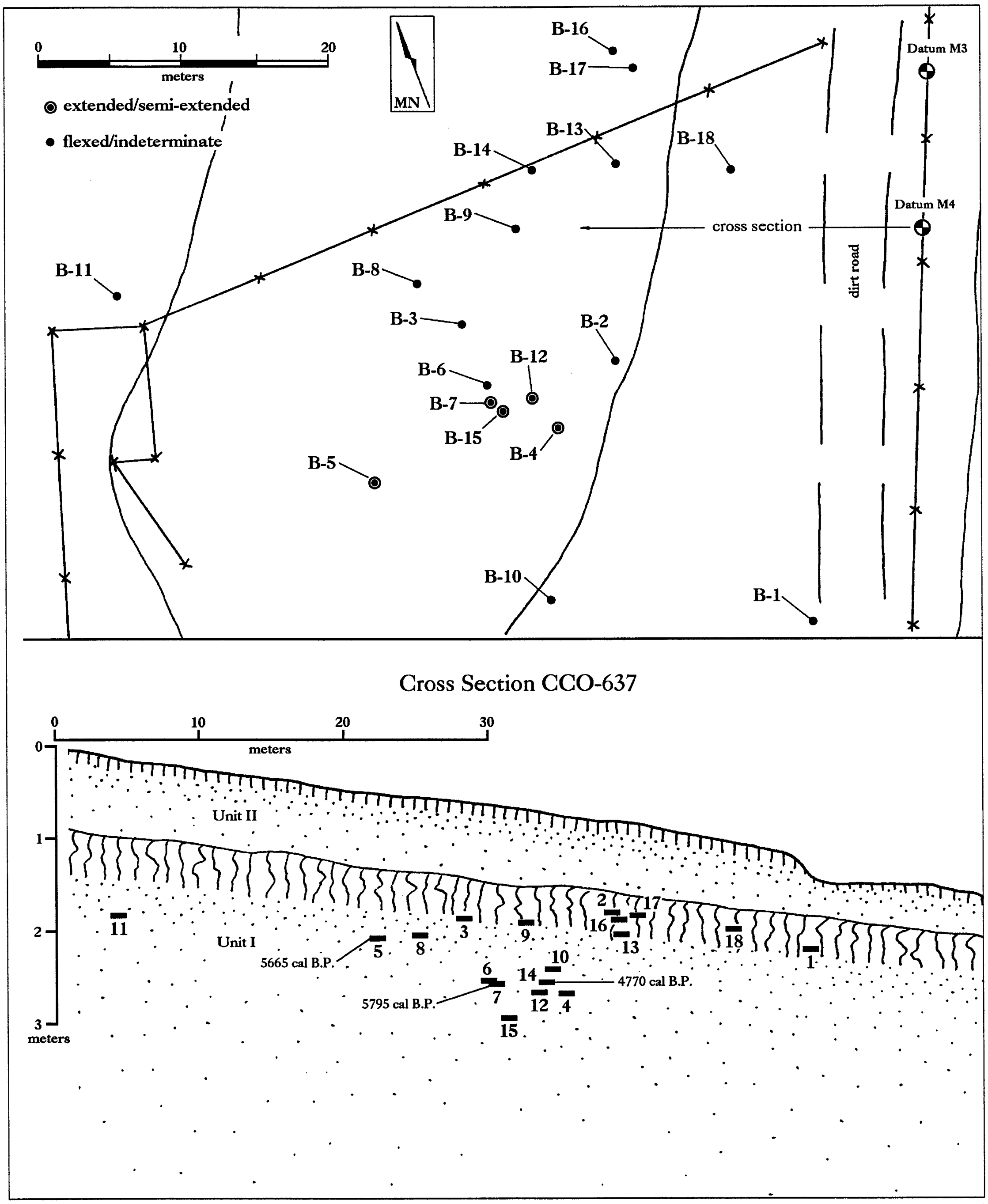


Figure III.21. Schematic Cross Section, CA-CCO-637. Location of cross section shown above; distribution of human burials below.

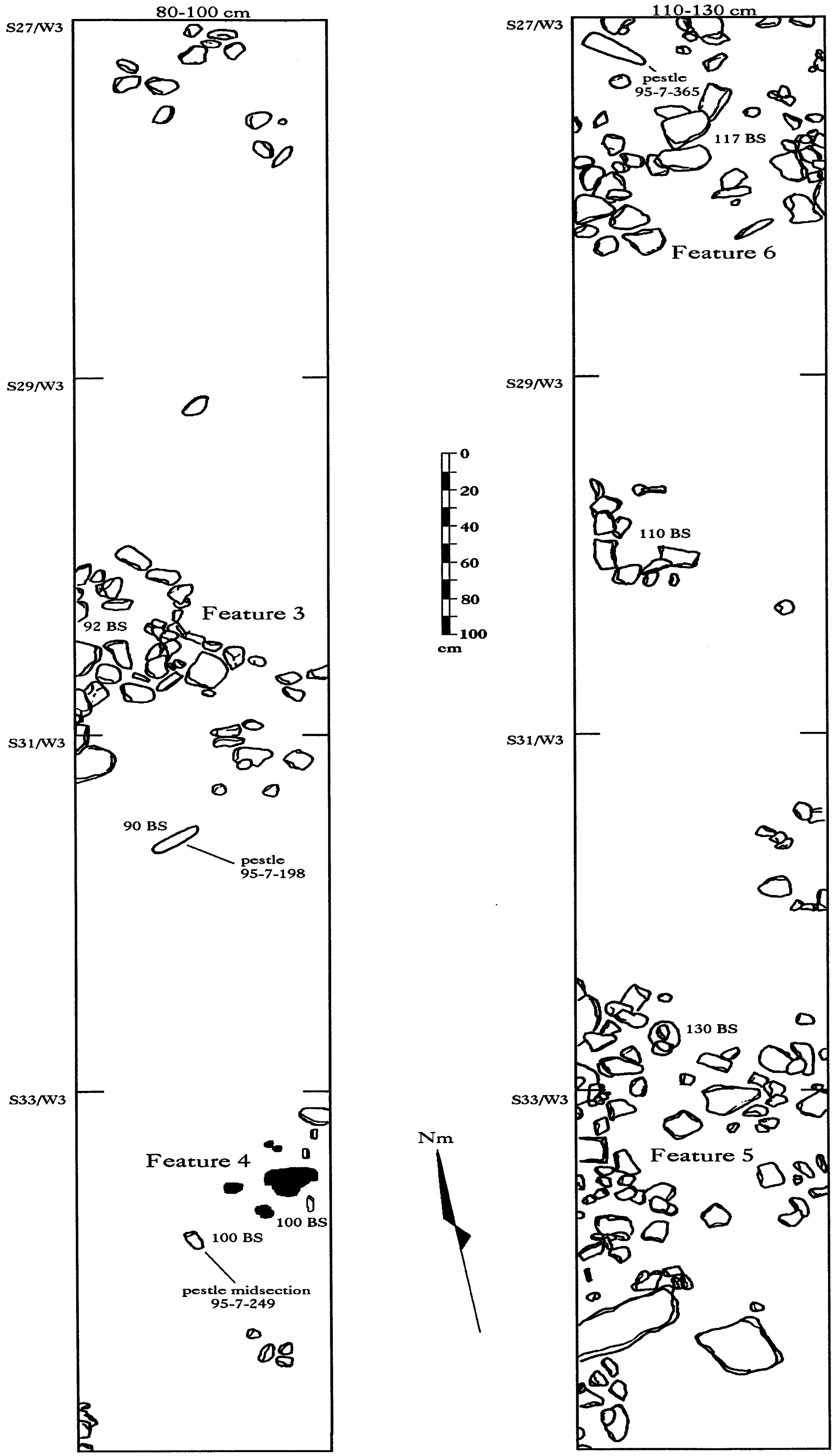


Figure III.22. Plan of Feature Distribution in Area Exposure at CA-CCO-637

CA-CCO-696

SITE DESCRIPTION

CA-CCO-696 is located between UTM grid coordinates 611620/4188040 and 611660/4188100 (Zone 10), as plotted on the NWIC base map, USGS Byron Hot Springs, Calif., 7.5' quadrangle. The site was situated at 300 feet (91 m) AMSL on the floodplain of the upper Kellogg Creek valley, just south of the footprint of the proposed dam (Figures III.4, 23). The horizontal distribution of the site measured approximately 250 m (southwest-northeast) x 60 m (northwest-southeast), for a total of 11,781 square meters. In 1996, after completion of the investigations described here, the remaining portions of the site were capped by about 10 m of artificial fill; the area will be permanently covered by water after the proposed reservoir is filled.

The site was originally discovered in December 1994, when buried archaeological material and human remains were identified in a geoarchaeological test trench; no archaeological materials had been noted on the surface of the site. These investigations determined that the site was composed of two separate archaeological deposits, each associated with a buried paleosol. The upper archaeological deposit, associated with the Vaqueros paleosol, contained a variety of cultural materials, including obsidian and local-stone flaking debris, burnt and unburnt bone, flaked and groundstone artifacts, bone tools, shell beads, and numerous mortuary and residential features. The lower deposit, associated with the Kellogg paleosol, contained a lower frequency of habitation debris and tools. An isolated human burial was recovered from the Kellogg paleosol during construction monitoring.

FIELD WORK

Field investigations at CCO-696 were conducted in three phases. The initial phase included the excavation of backhoe trenches, Test Units, and an Area Exposure. The second phase included burial removal, feature documentation, and additional backhoe-testing. The final phase involved monitored excavation during dam construction. Due to the high density of human burials encountered in the Vaqueros soil, unit excavation and burial removal proceeded concurrently. Unit excavation was eventually abandoned, and identification and removal of human burials became the primary focus of field work.

Backhoe-Trenching

Ten test trenches were excavated in the vicinity of CCO-696 for archaeological discovery and to reveal the subsurface deposits. The site was identified when buried archaeological materials were discovered while excavating a test trench (12-1-2, or Trench 1) as part of the subsurface survey. Trench 1 was later extended to determine the eastern extent of the site, while another trench was excavated within Exposure 5 to determine the western extent of the site. A single trench (7-27-1) was excavated to a depth of 400 cm below the surface to determine the vertical extent of the site. Additional trenches (not numbered) were excavated to establish site boundaries. The deposits in the trench walls were exposed using hand tools, documented, and sampled. A total of 136.5 m^3 of overburden and site deposit were excavated from test trenches at the site.

Trench 1 initially revealed an extensive buried archaeological deposit, including human remains, in association with the Vaqueros paleosol at a depth of 70 to 130 cm below the surface. A separate concentration of human burials was later discovered when Trench 1 was extended eastward. The Vaqueros paleosol exhibited a well-developed A horizon and a distinctive light-colored Bkt horizon that made it easy to recognize in the field. Although the depth of the Bkt horizon was relatively consistent across Trench 1, the A horizon was thicker at the west end of the trench than at the east end (Figure III 24). The paleosol was overlain by the Brentwood deposit, which exhibited a weakly developed (A/Bkj/C) soil profile that had formed in floodplain alluvium. Like the paleosol, the Brentwood deposit

was thicker at the west end than at the east end of Trench 1. No archaeological materials were found in association with the Brentwood deposit.

Trench 1 was extended across a small topographic depression in the eastern portion of the site that marked a buried channel elsewhere in the Kellogg Creek floodplain. The trench confirmed the presence of the eastern channel beneath the topographic depression. An examination of the deposits revealed that the channel had downcut through the Vaqueros alluvium and partially into the Kellogg paleosol before being backfilled by multiple aggradation episodes (Figure III.24). Although a few dispersed archaeological materials were present, no intact archaeological deposits were found in the alluvium-filled channel. The channel was finally capped by the Brentwood deposit that covers the surface of the Kellogg Creek floodplain. It appears that the buried channel represented a relatively persistent landscape feature that formed the eastern boundary of CCO-696. Radiocarbon ages of 1674 cal B.P. and 1754 cal B.P. were obtained from samples collected within the eastern channel section of Trench 1. Both samples indicate that the channel was being backfilled by sediments during the late Holocene.

The excavation of a trench within Exposure 5 revealed the presence of another buried channel deposit along the west side of the site. The channel had downcut through the Vaqueros alluvium to the surface of the Kellogg paleosol before being rapidly backfilled by multiple aggradation episodes. Although a few dispersed archaeological materials were found, no intact archaeological deposits were found in the alluvium-filled channel. The channel was finally capped by the Brentwood deposit that covers the surface of the floodplain. It appears that the channel was a relatively persistent landscape feature that formed the western boundary of CCO-696. A radiocarbon age of 780 cal B.P., obtained from a sample collected near the base of the channel deposit, indicates that it was backfilled during the late Holocene (Figure III.25).

Following the removal of burials from the Vaqueros paleosol, a trench (7-27-1) was excavated in the bottom of the cleared exposure to explore the Kellogg paleosol. Trench 7-27-1 had two purposes: (1) to assure that concentrations of burials were not located deeper in the Bkt horizon; and (2) to test the Kellogg paleosol for archaeological material. The trench was excavated in line with the former Exposure 1/2 balk, beginning at approximately 150 cm below surface.

Deeply buried archaeological materials were discovered while monitoring the backdirt removed from the trench excavation. The trench revealed that the Vaqueros alluvium extended to a depth of about 320 cm below surface, where it overlay the Kellogg paleosol (Figure 111.26). It was determined that an intact archaeological deposit, including pieces of charcoal, heat-affected rock, burnt and unburnt bone, and culturally modified flaked stone, was associated with the Kellogg paleosol. No human burials or other archaeological materials were observed in the lower 175 cm of the overlying Vaqueros alluvium. Due to the stratigraphic position of the Kellogg paleosol and the associated artifact types, it appeared that both were early Holocene in age. Based on these determinations, the decision was made to conduct further sampling of the deeply buried archaeological deposit at the site (see Deep Exposure Excavation below).

A final test trench was excavated from within the Deep Exposure in an attempt to determine the depth to bedrock and thickness of the alluvium. Groundwater was encountered in the trench at a depth of about 425 cm, and a well-developed paleosol (4Ab) was found at a depth of about 725 cm below surface. Bedrock was not encountered, indicating that the alluvium is greater than 725 cm thick at this location. A radiocarbon date of 15,710 cal B.P. was obtained from a sample collected from the buried paleosol, indicating that it is late Pleistocene in age.

Six allostratigraphic units were identified as a result of backhoe test trenching at CCO-696:

- Soil Unit I consisted of floodplain alluvium with a well-developed (4Ab/Bktb) soil profile that represents a late Pleistocene paleosol.
- Soil Unit II consisted of floodplain alluvium with a well-developed (Ab/Btkb) soil profile that represents the early Holocene-Kellogg paleosol.
- Soil Unit III-f consisted of floodplain alluvium with a well-developed (Ab/Bktb) soil profile that represents the middle Holocene-aged Vaqueros paleosol.

- Unit IV consisted of channel and floodplain alluvium with a weakly developed (A/C) soil profile that represents an episode of aggradation and subsequent stability in the eastern channel during the late Holocene.
- Unit V consisted of channel and floodplain alluvium with a weakly developed (A/C) soil profile that represents a second episode of aggradation and subsequent stability in the eastern channel during the late Holocene.
- Unit VI consisted of channel and floodplain alluvium with a weakly developed (A/Bkj/C) soil profile that represents the Brentwood deposit at the surface.

Hand-Excavation

Information obtained from Trench 12-1-2 was used to direct the excavation of vertical units and area exposure. The AEU excavation focused on the western portion of the site, where the vertical separation between the Brentwood deposit and the Vaqueros paleosol could be clearly defined. TUs were used primarily to sample the eastern portion of the site, where the Brentwood deposit and the A horizon of the Vaqueros paleosol were relatively thin. A combined total of 23.8 m^3 of site deposit were excavated from the AEs and TUs.

Area Exposure

Excavation of the area exposures began with the removal of the overlying Brentwood deposit from the underlying Vaqueros paleosol. Two parallel exposures were laid out, north to south (N11°E), perpendicular to Trench 12-1-2. A 1.2-m-wide balk was left between the exposures for stratigraphic control. Exposure 1, on the west side of the balk, measured 7 x 15 m and was rough-cut with a backhoe employing a standard bucket. To level the floor of the exposure, a 2-ft. long by 1-inch wide thick steel plate was attached over the teeth of the backhoe bucket, creating a smooth cutting blade. The plate was used to scrape the remaining overburden from the paleosol. The Vaqueros paleosol, which was found to slope moderately to the northwest, was exposed at approximately 50 to 70 cm below surface. The walls of the exposure were straightened by hand, using mattocks and shovels, and a ramp was excavated at the south end of the exposure to allow easy access to the excavation. Exposure 2, on the east side of the balk, measured 6 x 15 m and was excavated to a depth of 50 cm, employing the same methods used to create Exposure 1.

The primary site datum (Datum A) was established at the northern end of the Exposure 1/2 balk and an area exposure grid was laid out on the paleosol in Exposure 1. The grid measured 5 x 11 m and was composed of eight 2 x 2 m units spaced 1 m apart. A 1-m-wide balk was left between excavation units for stratigraphic control and to serve as contexts for later fine-grained sampling of the deposit. An arbitrary subdatum was established at the northwest corner of the grid (N0/W0) and all units were identified by distance in meters from the grid datum. The initial depths of all units were recorded below Datum A, and each unit was leveled to the next 10-cm interval below the datum. Unit excavation continued in arbitrary 10-cm levels. Excavated matrix was placed in wheelbarrows and removed from the exposure to a screening station. All unit matrix was screened using the 4 x 8 ft. megascreen (1/4-inch control [dry] recovery method). A total 12.8 m^3 of site deposit was sampled from the AEUs.

Six of the eight units staked were excavated (N0/W5, N0/W2, S3/W5, S3/W2, S6/W2, S9/W2). Human burials were encountered in the 80- to 90-cm level of S3/W2 and S6/W2 and in the 100- to 110-cm level of N0/W2 and S3/W5. Unit structure and controlled excavation was maintained up to the time of burial exposure. In instances where burials extended into standing balks between units, the balks were removed in a single level and screened. Burials were fully exposed, recorded, and removed. In units where no burials were encountered, excavation was halted in the sterile Bkt horizon of the Vaqueros paleosol between 100 (S9/W2) and 130 cm (N0/W5) below datum. An additional 1.95 m^3 of deposit were screened from the burial exposures.

Test (Exploratory) Units

Concurrent with area excavation, a third mechanically excavated exposure (Exposure 3) was created. Exposure 3 measured 8 x 15 m by 0.5 m deep and was laid out east of Exposure 2. A 1.2-meter-

wide stratigraphic balk was left between the two exposures. A 2 x 2 m exploratory, or test, unit (TU) was laid out in Exposure 3 to sample the nature of the archaeological deposit in this portion of the site. The unit was initiated at grid point S9/E9 and leveled to 70 cm below Datum A. Unit S9/E9 was excavated in 10-cm levels below Datum A and megascreened. A nearly continuous scatter of heat-affected sandstone was encountered in the 80- to 90-cm level and a human cranium was exposed in the 90- to 100 cm level. Following the identification of human remains, unit excavation was abandoned and further work focused on exposing and isolating the burial. During exposure of the burial, two additional burials were encountered partially within the unit.

Information obtained from Trench 12-1-2, TU S9/E9, and the AEUs was used to direct further exploratory excavation. Extended burials identified in the eastern portion of the site contrasted with the flexed burial posture identified to the west, indicating possible cultural/temporal differences between the two site loci. Three test units were excavated in the eastern site locus to determine the nature and extent of the archaeological deposit and to recover culturally/temporally diagnostic artifacts suitable for defining horizontal site components. Because the modern and buried soils were undifferentiated in the eastern site locus, units were initiated at surface level. Exploration began with a 1 x 2 m TU laid out at grid coordinates S2.5/E28. The initial depths were recorded below Datum A and the unit was excavated in arbitrary 10-cm levels below surface, and megascreened. Increased recovery of cultural materials began with the 30- to 40-cm level. The unit was abandoned when recovery decreased in the Vaqueros paleosol Bkt horizon, at 90 cm below the surface of the exposure.

Based on the positive results of Unit S2.5/E28, two additional 2 x 2 m units were excavated in the eastern locus of the site. Units S2.5/E25 and S2.5/E22 were laid out west of the initial excavation unit, leaving 1-m-wide balks between the three excavations. The initial depths below Datum A of each unit were recorded and the units leveled to the next 10-cm interval; excavation continued in arbitrary 10-cm levels , with excavated matrix megascreened. Unit S2.5/E22 was excavated to 70 cm below surface (70 to 140 cm below datum) and Unit S2.5/W25 was excavated to 80 cm below surface (90 to 160 cm below datum). Similar to the original TU, increased recovery of cultural material began in the 30- to 40-cm level (below surface) of both units.

A single 2 x 2 m TU was excavated to provide information on the nature and extent of the deposit in the southeast portion of the site. The TU was laid out on the surface at grid point S9/E18 and the initial depths below Datum A were recorded. The unit was leveled to the next 10-cm interval and excavated in arbitrary, 10-cm levels below datum. It was excavated to 80 cm below surface (50- to 130-cm below datum) and abandoned when recovery decreased in the Vaqueros paleosol Bkt horizon. A total of 11.0 m^3 of deposits were sampled by the TUs.

Burial Removal and Feature Recording

Due to the likelihood that CCO-696 would be heavily impacted during dam construction, the decision was made—in consultation with the CCWD and Native American Most Likely Descendants—to remove as many of the human burials as possible from the site. The search for burials began with the removal of the Brentwood deposit from the Vaqueros paleosol. Seven mechanically excavated exposures were created. Exposure numbers were designated in the order of excavation (Exposures 1-7), beginning with Exposures 1 to 3, excavated during the exploratory phase. All but one of the exposures (Exposure 4) were laid out on the south side of Trench 12-1-2, with the long axis oriented north-south (N11°E). Exposure 4 was located north of Trench 12-1-2 and was laid out with the long axis east-west (S79°E). The combined exposures covered an area of approximately 70 m (east-west) x 66 m (north-south), for a total of 4,620 m^2.

Guided by the project geoarchaeologist, the backhoe operator mechanically stripped the Brentwood deposit from the paleosol. The backhoe was used to extend Exposures 1 to 3 an additional 15 m south, maintaining the 1.2-m-wide balks between excavations. Two additional exposures (Exposures 4 and 5) were created with the backhoe. Exposure 4 was excavated on the north side of and parallel to Trench 12-1-2. The exposure measured 8 m (north-south) x 24 m (east-west) and

approximately 50 cm deep. The fifth exposure (Exposure 5) was excavated on the west side of and parallel to Exposure 1, leaving a 1.2-m-wide balk between the two excavations. Exposure 5 measured 10 m (east-west) x 30 m (north-south). Excavation of Exposure 5 followed the natural slope of the paleosol, ranging in depth from approximately 30 cm deep on the south end to 150 cm deep at the northwest corner.

To expedite the excavation of the Brentwood deposit and to free-up the backhoe for use in the burial-removal process, a bulldozer was employed to expand existing excavations and to create two additional exposures. Exposure 6 was created on the east side of Exposure 3, leaving a 1.2-m-wide balk between the excavations. Due to the indistinct boundary between the Brentwood deposit and the Vaqueros paleosol in this location, Exposure 6 was excavated to an arbitrary depth of 40 cm. The irregularly shaped exposure was designed to reveal a section of the Vaqueros paleosol between Exposure 3 and the buried eastern channel. Exposure 6 measured 35 m north-south; the southern half of the exposure measured 7 m east-west, while the northern half measured 34 m east-west.

A bulldozer was also used to create Exposure 7, on the west side of Exposure 5. A 1.2-m-wide balk was left between the two excavations to maintain stratigraphic control. Exposure 7 measured 8 m (east-west) x 32 m (north-south) and was excavated to a depth of approximately 40 cm. The buried western channel was visible running the entire length of the exposure. Only a narrow section of the Vaqueros paleosol was uncovered along the eastern margin of Exposure 7.

Using the bulldozer, Exposures 4 and 5 were doubled in size. Exposure 5 was extended south, exposing the paleosol for an additional 27 m. The 1.2-m-wide balks were maintained between adjacent exposures. Exposure 4, parallel to Trench 12-1-2 on the north, was extended 8 m north and 21 m east. Exposure 4 was excavated to depths ranging from 80 cm on the west to 30 cm on the east. A combined total of 1,252.9 m^3 of the Brentwood deposit were removed from Exposures 1-7.

Following the initial rough-cutting of the new exposures, sidewalls were straightened using mattocks and shovels. A 2-ft.-long x 1-in.-thick steel plate was attached over the teeth of the backhoe bucket and used to level the surface and clear loose debris from the exposures. Beginning in Exposure 2, the Vaqueros paleosol was slowly stripped in search of burials and residential features. A backhoe with a metal blade attached to the bucket was used to systematically scrape from north to south across the exposures. With the smooth-cutting blade, 60-cm-wide scrapes, 2- to 4-cm-deep, were made; they were carefully monitored for burials, features, and in situ artifacts and faunal remains. Balks were maintained between the exposures for stratigraphic control.

When human remains were encountered, the nature and extent of the find was determined, a burial number assigned (if appropriate), and the bearing and distance from one of three site datums (Datum A, M2, or M3) were recorded. The depth of burials was always recorded below Datum A. Once an exposure was completely stripped, burials were isolated, exposed, recorded, and removed. All features encountered during exposure excavation were recorded and, where appropriate, carbon and flotation samples were collected. In situ artifacts and diagnostic faunal remains were collected and recorded by distance and bearing from one of the three site datums; depth was recorded below Datum A. Artifacts found out of context were collected and recorded with reference to their approximate depth and location within the exposure (north, central, or south). Soil removed from the exposures was taken off site, spread out using the backhoe and hand rakes, and closely examined for human bone and artifacts.

Following the removal of burials from an exposure, the backhoe stripping process was repeated until no further human remains were identified. Exposure excavation was halted in the Bkt horizon of the Vaqueros paleosol, 10 to 40 cm below the depth of the deepest burial. The paleosol was stripped from all exposures except for Exposure 7 and the north half of Exposure 4. The backhoe was used to level the remaining balks, scrape-down high spots, and clear all debris from the combined exposures. A total of 155 burials, representing a minimum of 171 individuals, were excavated from the exposures. Twenty residential features were recorded, and numerous artifacts and faunal remains were collected. A total of 1,688.4 m^3 of the Vaqueros paleosol were removed from Exposures 1 through 6 using a backhoe.

Micro-Unit Excavation and Flotation Sampling

Prior to their removal, all standing balks were carefully examined and stratigraphic profiles were drawn. Information from balk profiles was used to guide additional fine-grained, stratigraphic recovery from of the archaeological deposit. Vertical patterning of depositional units and cultural materials was most clearly represented in the Exposure 1/5 balk, in the western portion of the site. At least two nearly continuous rock lines were defined in the profile, indicating former occupation surfaces. Five 0.5 x 0.5 m micro-units (M5S-M25S) were laid out at 5-m intervals along the balk. The Brentwood deposit was removed, and unit excavation was initiated on the surface of the paleosol. Micro-units were excavated in arbitrary, 10-cm levels to varying depths within the Bkt horizon. Unit matrix was screened using the 1/8-inch control (wet) recovery method. A total of 1.95 m^3 of matrix were sampled from the micro-units.

Stratigraphic balks also provided additional contexts for flotation sampling. A total of nine column samples were collected. Columns 1 and 2 measured 0.25 x 0.25 m and were excavated in the Exposure 1/2 balk. The columns, excavated in arbitrary 10-cm levels, were designed to retrieve a vertical sample of site microconstituents, such as fish bone and plant macrofossils. Column 1 was excavated from the surface to 120 cm, while Column 2 was initiated on the Vaqueros paleosol, at 45 cm below surface, and excavated to a total depth of 115 cm. Seven additional column samples were excavated to retrieve an areal sample of site microconstituents. Columns 3 to 9 measured 0.25 x 0.25 m and were excavated from the Vaqueros paleosol in a single level. Columns 3 to 5 were collected from the Exposure 1/5 balk, Columns 6 to 7 were collected from the Exposure 3/6 balk, and Columns 8 to 9 were collected from the Exposure 5/7 balk. (See Appendix H for results.)

Deep Exposure Excavation

Based on the examination of the deposits exposed in Trench 7-27-1, an area of relatively concentrated cultural material was targeted for additional investigation. Two backhoes were used to create a stepped exposure on either side of Trench 7-27-1, down to the level of the Kellogg paleosol. The top of the exposure measured 10 m (north-south) x 12 m (east-west). A 4 x 9 m section of paleosol was exposed in the bottom of the excavation, at 340 cm below surface. The paleosol was excavated mechanically, rather than by hand, to maximize the volume of deposit examined. A total of 21.84 m^3 of Kellogg paleosol were excavated.

The bottom of the exposure was divided into six 1.3 x 4 m-units (NW1, W1, SW1, NE1, E1, SE1). The units were identified relative to Trench 7-27-1 and their position in the exposure (e.g., the northernmost unit, west of 7-27-1, was designated Unit NW1). Using the backhoe bucket, each unit was carefully scraped down to just above the watertable at 415 cm. Unit excavation was closely monitored and all identified artifacts recorded in situ. Matrix removed from each unit was placed at the surface and spread out with the second backhoe. The soil was thoroughly raked and all identified cultural material was collected. To maintain provenience, one unit was excavated at a time, and the matrix examined and cleared before the next unit was initiated.

To acquire a fine-grained sample of cultural constituents, three column samples were collected for flotation analysis. Column 1 was excavated from Unit W1. The column measured 0.25 x 0.25 m and was excavated, from 340 to 410 cm below surface, in arbitrary 10-cm levels. Columns 2 and 3 were excavated in a single level from the paleosol in the northern wall of the exposure. These two samples were collected from areas that contained high concentrations of carbon.

Construction Monitoring

Cultural material found in backhoe trenches north of the primary archaeological deposit—including flaked-stone artifacts, faunal remains, and heat-affected rocks—indicated the likelihood that human burials would be encountered during dam construction in areas adjacent to CCO-696. Consequently, excavation associated with dam construction was monitored within 200 m of the archaeological site. Due to the potential for human burials in both the Vaqueros and Kellogg paleosols, monitoring was carried out to depths of more than 5 m. Excavation in the 200-m-long sensitive zone was

conducted with paddle-wheel scrapers and carefully monitored by a team of archaeologists and Native American consultants. Each pass of the heavy equipment was closely inspected for human remains, artifacts, and other cultural features. When human remains were encountered, a 5-m-wide buffer zone was established around the remains and construction excavation was allowed to continue in adjacent areas. Five human burials were identified and removed from the footprint of the dam site as a result of construction monitoring. Three were identified in the A horizon of the Vaqueros paleosol, one from the Bkt horizon of the Vaqueros paleosol, and one from the Kellogg paleosol. All in situ artifacts, residential features, and human burials were recorded with reference to one of three datums (Datum M4, M5, or M6). All human remains were carefully removed and placed in a secured storage facility prior to removal to the ASC Collections Facility for analysis.

FINDINGS

Site Summary

Due to the complex structure of the archaeological record at CCO-696, analytical units were distinguished in accord with the spatial/temporal distribution of artifacts, features, and burials, within the site. Four ostensibly single-component site loci were defined.

An early Holocene component, CCO-696 Deep—associated with the Kellogg paleosol—included archaeological material recovered from Trench 7-27-1, AEUs (NW1, W1, SW1, NE1, E1, SE1), and monitored construction grading. Within the Vaqueros paleosol there were two primary concentrations of cultural material, identified as the North and South loci. The North Locus, primarily associated with the Emergent period, contained artifacts, burials, and features found during construction monitoring. The southern portion of CCO-696 was the primary focus of the field work at the site. For analytical purposes, the South Locus was further subdivided into East and West loci. The East Locus, dating to the Upper Archaic/Emergent-period transition, was distinguished by a discrete concentration of extended burials and included material recovered from Exposure 6, the east end of Exposure 4, and four vertical units (S2.5/E22, E25, E28, and S9E18). The West Locus, which primarily dates to the Upper Archaic period, contained the majority of burials, features, and artifacts identified at the site, including material collected from Exposures 1-5, AEUs, and unit S9/E9.

Site Stratigraphy and Formation Processes

Natural surface deposits at CCO-696 consisted primarily of fine-grained alluvial sediments deposited by episodic, overbank floodplain aggradation. While this deposit covered the entire surface, it was found to be thicker on the west than on the east. Very few archaeological remains were associated with this deposit at CCO-696. Chronostratigraphic analysis indicates that these surface deposits represent the Brentwood floodplain facies (665 to 250 B.P.).

Layers of alternating fine- and coarse-grained deposits were found at depths from 1.5 m to more than 4 m in some areas, indicating that former stream channels were buried beneath the eastern and western portions of the site. A few widely dispersed archaeological materials were found in association with these channel deposits. Radiocarbon dates from the buried channel deposits at the site indicate that these streams were active between about 2300 and 1000 B.P.

Immediately below the Brentwood deposit was a well-developed paleosol that formed in fine-grained alluvial sediments deposited by episodic, overbank floodplain aggradation. It was this deposit that contained the vast majority of archaeological remains, including many residential features and human burials. While located throughout the site, the Ab horizon of this deposit was found to be thicker on the west than on the east side of the site. Chronostratigraphic analysis indicates that this buried paleosol represents the floodplain facies of the Vaqueros deposit (6355 to 2735 B.P.).

The completeness of the Vaqueros deposits in the East Locus was found to differ from that in the West Locus (Figure III.27). The maximum thickness of the Vaqueros Ab horizon in the West Locus was 70 to 80 cm, while the maximum thickness of the same horizon in the East Locus was only 20 to 30 cm. Significantly, the Vaqueros Bktb horizon occurred at about the same depth throughout the site,

regardless of the Ab horizon thickness. The regularity of the Vaqueros Bktb horizon across the site seems to indicate that a portion of the Vaqueros Ab horizon was removed from the eastern margin of the site by erosion, along with associated, and presumably earlier, archaeological materials. From the amount of vertical separation between artifacts and human burials in the West Locus it appears that the Vaqueros paleosol in that location has remained relatively intact. Together this suggests that the archaeological deposits in the West Locus are not only comparatively complete, but that they may also reflect a longer span of time than those of the East Locus.

Immediately below the Vaqueros deposit was another well-developed paleosol that formed in fine-grained alluvial sediments deposited by episodic, overbank floodplain aggradation. Some archaeological remains, including a human burial, were found to be associated with this deposit. Significantly, the archaeological materials were concentrated well within the Btkb horizon at depths of 370 to 420 cm below the surface. The deposit was located throughout the area between the eastern and western buried channels. Chronostratigraphic analysis indicates that this buried paleosol represents the floodplain facies of the Kellogg deposit (10,875 to 7255 B.P.).

Immediately below the Kellogg deposit, yet another well-developed paleosol was discovered that consisted of fine-grained alluvial sediments. Since the deposit was found beneath the water table at depths of more than 720 cm below the surface, its full nature and extent could not be determined. A few mineralized land-mammal remains were found in association with the deposit, but no cultural remains were identified. A single radiocarbon date from the deposit of 15,710 cal B.P. confirms that it is late Pleistocene in age.

The history of landscape evolution at CCO-696 can be interpreted from the LSA identified at the site. After a period of floodplain stability lasting at least 4,500 years, the Pleistocene paleosol was soon buried by large-scale aggradation that created the Kellogg deposit, beginning about 11,000 years ago. As aggradation rates decreased in the early Holocene, the floodplain was dominated by soil formation and channel incision, with occasional overbank aggradation. During this relatively stable period, the site was occupied by people, and at least one individual was buried in the Kellogg floodplain. Stability again gave way to instability around 7,200 years ago when the Vaqueros deposit was created by another episode of large-scale aggradation. By about 6,500 years ago, aggradation rates decreased, allowing soil formation, channel incision, and occasional overbank aggradation to dominate the floodplain. A thick, well-developed horizon of calcium carbonate was formed in the Vaqueros deposits, supporting the contention that environmental conditions were drier during the middle Holocene.

The Vaqueros floodplain remained relatively stable well into the late Holocene and the site was again occupied by people, perhaps in response to improved environmental conditions. Materials recovered from the eastern channel indicate that it was an active stream, vegetated with California buckeye, Pacific madrone, and big-leaf maple trees around 2,300 years ago. Around 1,500 years ago, erosion along the eastern stream channel removed the upper part of the Vaqueros Ab horizon in the site's East Locus. About the same time, it appears that the western channel migrated into the area of Exposures 5 and 7 along the west side of the site. The eastern channel was abandoned by about 1,000 years ago, and has since been backfilled by floodplain sediments. The western channel remained active in the West Locus until about 780 years ago, when it migrated westward toward its modern course. By 665 years ago, the western channel became choked with sediments that were avulsed overbank onto the Vaqueros paleosol. This episode of aggradation lasted for about 100 years, eventually creating the Brentwood deposit. The rapid entrenchment of Kellogg Creek over the last few hundred years has increased the channel's flood capacity, effectively stopping the aggradation of the Brentwood deposit. Since then, the floodplain has been dominated by stability and soil formation.

Post-occupational disturbance processes have undoubtedly affected the systemic context of archaeological deposits in many portions of the site. Literally thousands of active and inactive burrows (krotovina), excavated by various ground-dwelling animals, were observed throughout the site. The subsurface extent of this disturbance was noted in many of the trench walls and other excavated exposures, with some burrows extending into Vaqueros deposits to more than 200 cm below surface.

Tooth marks produced by the gnawing of ground-dwelling animals were found on many of the human skeletal remains, providing direct evidence of this type of disturbance. At the same time, it was apparent that some burials had been disturbed, whether intentionally or accidentally, by the emplacement of later burials. The occurrence of extra or missing skeletal elements in many of the burials illustrates the combined extent of these disturbance processes. In addition, due to the thinness of the Brentwood and Vaqueros deposits in the East Locus, the same amount of disturbance may have resulted in even more mixing of archaeological materials originating from different contexts. Given these factors, it is very likely that many artifacts were displaced from their original systemic context.

Burials

Human burials representing a minimum of 174 individuals were recovered from CCO-696. The majority of the burials were associated with the mid- to late-Holocene, Vaqueros paleosol. One burial (Burial 160), found during construction grading, was recovered from the early Holocene, Kellogg paleosol. Corresponding to the chronostratigraphic position of the interment, a charcoal sample collected from Burial 160 matrix produced a radiocarbon date of 7400 cal B.P.

Burials from the Vaqueros paleosol were primarily found within one of the five backhoe exposures in the South Locus (Figure III.28). During construction grading, however, an isolated group of interments was identified in the North Locus. The northern group included four burials. One tightly flexed interment (Burial 158) was found deeply buried (256 cm below datum) within the Bkt horizon of the Vaqueros paleosol. Due to the depth and position within the soil profile, the burial appeared to have been interred when the Vaqueros unit was aggrading, approximately 6300 to 3000 B.P. The other three burials from the North Locus, including a cremation and two flexed interments, were associated with the A horizon of the Vaqueros unit. Temporally diagnostic projectile points and shell-bead types indicate that the three burials date to the Emergent period (post 950 B.P.). Consistent with the diagnostic artifacts, a charcoal sample from the cremation (Burial 157) produced a radiocarbon date of 690 cal B.P.

The primary concentration of burials from the Vaqueros paleosol was identified in the South Locus of CCO-696. The majority of interments were found within the A and A/B horizons, from 47 to 149 cm below surface; a single burial (Burial 155) was identified within the Bkt horizon at a depth of 181 cm below surface. Within the burial population, four primary burial styles were defined: tight flex = 84; loose flex = 18; extended = 11; and semi-extended = 8. In addition, a group of 3 individuals were cremated (Burial 115, 115A, 115B), and 46 interments were so deteriorated and/or disturbed that no burial position could be determined.

A variety of evidence indicated that at least two cultural/temporal components were present within the burial population at CCO-696 South. Although no one characteristic clearly differentiated the components, strong correlations were found in a combination of attributes: burial position, body orientation, artifact associations, and horizontal and vertical distribution patterns.

The main component at the site included the majority of tight and loosely flexed burials. Based on maximum depths and shell-bead associations, at least 5 extended burials (2 extended, 3 semi-extended) were also associated with this component (Burials 26, 34, 60, 137, 154). Approximately 80% of the burials were oriented with the head towards the southwest quadrant, between 180 to 270 degrees (magnetic north). Flexed burials tended to be concentrated in the north end of Exposures 1 and 2 in the West Locus. They ranged in depth from 60 to 181 cm below surface, with a mean depth of 107 cm below surface.

Temporally diagnostic shell-bead types recovered with 58 burials included *Macoma* Disk, *Olivella* Split, Saucer, and Spire-Lopped. This combination of bead types is thought to date to the Early/Middle-period transition and the early Middle period, approximately 2500 to 1900 B.P. (Bennyhoff in Elsasser 1978; Bennyhoff and Hughes 1987: Scheme B1). A single flexed burial (Burial 65) had bead associations diagnostic of the Middle/Late-period transition. These included 1 *Olivella* Thin Rectangle and 1 *Olivella* Square Saddle, a combination of types thought to date between approximately 1300 to 1000 B.P. (Bennyhoff and Hughes 1987: Scheme B1). Consistent with the bead types, radiocarbon dates

from charcoal associated with four flexed burials ranged from 2355 to 1320 cal B.P. Two additional dates of 2765 and 1840 cal B.P., obtained from two indeterminate burials, appear to correspond with this component. Despite the two younger beads and the radiocarbon date of 1320 cal B.P., the remainder of chronological evidence indicates that the majority of burials probably date between approximately 2700 and 1600 B.P.

A second, younger, component was also identified and was best represented in the East Locus. This component was composed of burials found in an extended position (8 extended and 4 semi-extended), oriented with the head towards the northwest and north (270 to 40 degrees magnetic north). Spatially, these burials tended to occur alone or in groups along the former creek banks in the eastern and western portions of the site (Exposures 4, 5, and 6). The assignment of these burials to a younger component was based primarily on depth differences. The combined burials, ranging from 56 to 87 cm b.s., averaging approximately 35 cm shallower (72 cm b.s.) than those from the older component. Although a discrete group of 5 extended burials was identified in the East Locus, the stratigraphic separation between the components was best observed on the western edge of the West Locus in Exposure 5. The 5 older burials (4 flexed and 1 semi-extended) ranged in depth from 96 to 127 cm b.s., whereas the extended burials representing the younger component ranged in depth from 62 to 87 cm b.s.

Despite the lack of diagnostic artifacts or radiocarbon dates, this component appears to be younger than 1300 B.P., but older than the burials from CCO-696 North, dated to 690 B.P. Obsidian-hydration readings on specimens from Feature 20, found directly below two extended burials in Exposure 5 (Burials 142 and 144), are consistent with this time span. Five Napa Valley obsidian hydration readings from the feature ranged from 3.4 to 2.4 microns (1770 to 880 B.P.), with a mean of 2.7 microns (1120 B.P.).

Features

A total of 34 archaeological features were recorded at CCO-696, including 27 from the South Locus and 7 from the North (Figure III.29). One feature was found during AEU excavation, 26 were identified during backhoe exposure excavation, and 7 were discovered during monitored construction grading in the North Locus. Several feature types were recorded, including 8 baked-soil hearths, 5 refuse scatters, 5 daub concentrations, 4 storage pits, 4 clusters of milling equipment, 3 rock hearths, 3 post holes, 1 storage pit, 1 antler cache/work area, and the possible outline of a house.

South Locus

The majority of features found at CCO-696 South were isolated finds along the west and north sides of the site, identified during backhoe excavation. Seven features—including daub concentrations, a fire hearth, a storage pit, and post holes—were all found within a 3-m radius of one another, possibly representing the remains of a single domicile.

Unit N0/W2, Feature A: Refuse Scatter. Exposed in the 90- to 100-cm level of N0/W2, this feature was a concentration of 60+ unaltered and fire-affected sandstone cobbles identified in the Vaqueros paleosol. The loose cluster included one large cobble (70 x 40 x 20 cm) surrounded by numerous small cobbles that ranged in length between 3 and 10 cm. The feature concentration was primarily confined to the central portion of the unit, measuring approximately 150 cm (north-south) x 100 cm (east-west). A less concentrated distribution of cobbles was identified at the same level throughout most of the unit. Due to the general lack of organization, this feature was considered to represent a refuse scatter dispersed on a former occupation surface.

Feature 1: Possible Daub. This feature, located 9.3 meters from Datum A at a bearing of N74°W, was identified in the Vaqueros paleosol between 83 and 115 cm below Datum. Feature 1 consisted of a concentration of baked soil measuring approximately 50 cm in diameter (Figure III.30). The cluster was composed of individual lumps of baked soil ranging in length between 2 and 12 cm. Four large pieces, toward the center of the cluster, were fire-blackened; the remainder of pieces were red from fire-alteration. Due to the discrete composition of the baked-soil pieces, the feature did not appear to have been baked in situ. Although the composition and structure of the feature was similar to other baked-soil

concentrations interpreted as daub, Feature 1 lacked impressions of grass or other structural elements, found in daub features from the site (i.e., Features 4, 5, 12). A flotation sample (Sample 68) of the baked soil contained an unidentified fish centrum and a sparse assemblage of plant macrofossils, including acorn, manzanita, wild cucumber, goosefoot, and farewell-to-spring.

Feature 2: Refuse Scatter. Identified 5.7 m from Datum A at a bearing of N22°E, the feature consisted of a loose scatter of fire-affected sandstone cobbles measuring approximately 125 cm in diameter. Located 94 cm below datum in the Vaqueros paleosol, Feature 2 was composed of 50+ cobbles ranging in length between 5 and 15 cm. Matrix within the rock concentration contained pieces of calcined bone, several siltstone flakes, and flecks of charcoal. The lack of organization indicated that the cluster of sandstone cobbles represented a refuse scatter. Prehistoric interment of Burial 3 impacted the southwestern portion of the feature. A flotation sample (Sample 69) collected from the feature matrix contained almost no small seeds and only small amounts of large taxa, including acorn, manzanita, bay, and buckeye.

Feature 3: Hearth. This feature, identified 9.8 m from Datum A at a bearing of S44°W, was a large, homogenous area of fire-affected soil and ash located 104 to 130 cm below datum in the A/B horizon of the Vaqueros paleosol (Figure III.31). The ovoid surface of the feature measured 150 cm (east-west) x 130 cm (north-south). The central area of reddened soil was overlain by a roughly circular, 1- to 2-cm-thick veneer of white material, interpreted as ash. The ash measured approximately 85 cm in diameter and was very compact, or "cemented". In cross section, the red, fire-affected matrix was thickest at the center (25 cm), gradually thinning toward the edges. The transition between the feature matrix and underlying B horizon was vague, indicating that the soil-baking occurred in situ. Based on the configuration of the feature and absence of charcoal in the ash matrix, Feature 3 was interpreted as a well-used fire hearth. Two fragments of unidentified mammal bone and a deer molar were recovered from the feature exposure matrix.

Feature 4: Daub. Feature 4 was identified 15.9 m from Datum A at a bearing of S30°W, in the A horizon of the Vaqueros paleosol between 88 and 108 cm below datum. The feature appeared as a roughly circular, discontinuous patch of baked soil measuring approximately 50 cm in diameter. Making up the feature were individual lumps of baked soil ranging in size between 2 and 15 cm. Further examination in the laboratory revealed that the baked soil contained numerous grass-leaf and larger structural impressions. One large triangular-shaped piece (15 x 10 x 6 cm) had three parallel concave impressions, each measuring approximately 19 mm wide, running the length of one surface. On an adjoining surface, a single large (54-mm wide) concave impression ran perpendicular to the three parallel impressions. Four fragments of baked soil had large concave impressions similar to the aforementioned, all approximately the same size (+/- 54 cm wide). Two others had multiple, parallel concave impressions measuring approximately 6 mm wide running the length of the baked-soil fragments. All of the larger impressions appeared to be molds of structural elements, such as support poles and wattle, indicating that the baked soil probably represented daub. Two similar features (5 and 12) were identified nearby, as were a hearth (Feature 6), a large storage pit (Feature 7) and two smaller pits (Features 11A and 11B); Figure III.32 shows the cluster of features.

Feature 5: Daub. This feature, located 16.4 m from Datum A at a bearing of S24°W, was identified in the A horizon of the Vaqueros paleosol, between 88 and 110 cm below datum. Feature 5 was found approximately 100 cm east of Feature 4. Measuring approximately 70 cm in diameter, Feature 5 was composed of individual lumps of baked soil containing numerous grass-leaf impressions. Several large fragments of baked soil had parallel, concave impressions, measuring approximately 6 mm wide, identical to those found in Feature 4. Based on the composition of and impressions found in the baked soil, Feature 5 was also interpreted as daub. During the removal of Feature 5, a much larger concentration of baked soil (Feature 12) was identified just to the south. These two features appeared to be parts of a single concentration of daub.

Feature 6: Hearth. Identified 18.4 m from Datum A at a bearing of S30°W, this feature was located in the A/B horizon of the Vaqueros paleosol, between 102 and 125 cm below datum. Feature 6

was a discrete, irregularly shaped area of baked soil, measuring 80 cm in diameter. Identical to Feature 3, the central area of baked soil was immediately overlain by a compact, 1- to 2-cm-thick layer of white ash. In cross section, the feature was thickest (+/- 25 cm) near the center, gradually thinning towards the edges. The transition between the red feature matrix and underlying B horizon was vague, indicating that the soil was baked in situ. Based on the composition of Feature 6, it was interpreted as a fire hearth. Four Type A1a, Spire-Lopped, *Olivella* beads and 1 obsidian flake were recovered adjacent to the surface of the feature. A large piece of charred wood, found 70 cm east of Feature 6 at 103 cm below datum, produced an radiocarbon date of 2390 +/- 50, or 2355 cal B.P. A flotation sample (Sample 73) taken from the feature matrix, produced virtually no small seeds and only small amounts of large taxa, including acorn, manzanita, wild cucumber, bay, and Coulter pine. Five other features were located close to Feature 6: Features 4, 5, 7, 11, and 12 (Figure III.32).

Feature 7: Storage Pit. This pit feature, located 19.3 m from Datum A , at a bearing of S20°W, was identified in the B horizon of the Vaqueros paleosol between 103 and 130 cm below datum. The circular pit, filled with dark brown soil, was clearly visible in the greyish-brown B horizon. The feature was 130 cm in diameter and in cross-section, was bowl-shaped, measuring approximately 30 cm deep. The pit-fill was generally devoid of sandstone cobbles or other large constituents, however, at least four, +/- 5 cm long, cobbles were found resting on the bottom of the pit. The medial fragment of a bipointed, bone tool (95-8-624) was collected from the feature matrix. A variety of flaked-stone debris was recovered from the pit-fill, as well as, several fragments of freshwater mussel. Mammal bone found in the feature matrix included rabbit, squirrel, unidentified artiodactyl, and fragments of small, medium, and large mammal. Several vertebrae of minnow and unidentified fish were also collected. A flotation sample (Sample #74), taken from the pit-fill, was dominated by large taxa, including acorn, manzanita, bay, and buckeye. Small seeds included fiddleneck, goosefoot, farewell-to-spring, knotweed, pondweed, carrot, sunflower, bean, and unidentified grass. Feature 7 was part of a larger feature concentration that included Features 4, 5, 6, 11, and 12 (Figure III.32).

Feature 8: Possible Rock Hearth. Located 23.1 m from Datum A, at a bearing of N35°E, this feature was identified in the A horizon of the Vaqueros paleosol between 60 and 75 cm below datum. The feature was a loose cluster of 15+ fire-affected sandstone cobbles, ranging between 8 and 20 cm long. This discrete concentration of cobbles measured approximately 80 cm (north-south) x 50 cm (east-west) and was resting on a horizontal plane. Several charcoal flecks were identified in the feature matrix. The uniformity in rock size, and the absence of additional debris in the immediate vicinity of the concentration, indicated that it may have been constructed as a hearth or similar cooking feature.

Feature 9: Hearth. This feature, located 19.5 m from Datum A at a bearing of N39°E, was a discrete patch of baked soil identified in the A horizon of the Vaqueros paleosol, between 71 and 90 cm below datum. Measuring approximately 80 cm in diameter, the fire-affected soil was bisected by several krotovina. Numerous dispersed charcoal flecks were found in the feature matrix. In areas where the rodent disturbance had not obscured the lower boundary of the feature, a gradual transition was observed between the reddened feature matrix and underlying soil. The homogeneity of the baked soil was taken as evidence that the fire alteration occurred in situ, indicating that the feature may have functioned as a hearth.

Feature 10: Hearth. Feature 10 was located 13.6 m from Datum A at a bearing of N24°E and was identified in the A horizon of the Vaqueros paleosol between 74 and 94 cm below datum. This feature was composed of many small, baked-soil nodules mixed in a friable matrix of gray-ash and charcoal. The roughly circular feature measured approximately 50 cm in diameter, gradually dissipating at the margins and along the bottom. In cross section, the feature appeared dish-shaped, thickest (+/- 20 cm) near the center and thinning towards the edges. Due to the configuration and constituents, Feature 10 is interpreted as a hearth. A flotation sample (Sample 75) taken from the baked-soil, ash, and charcoal matrix contained a sparse assortment of plant macrofossils, including acorn, manzanita, bay, bedstraw, maygrass, sedge, bean, and poppy.

Feature 11: Possible Post Holes. Feature 11 was composed of two small pits, recorded as 11A and 11B, located 140 cm apart. Pit 11A was located 25.4 m from datum M2 at a bearing of S65°E, between 102 and 131 cm below Datum A. Pit 11B was located 25.7 m from Datum M2 at a bearing of S66°E between 101 and 134 cm below Datum A. The two pit features, filled with dark brown soil and cobbles, had been excavated into the grey-brown B horizon of the Vaqueros paleosol. While the edges of the pits were easily distinguished, the bottom of each was indistinct. In diameter, 11A measured 47 and 11B measured 38 cm. Rather than appearing bowl-shaped in cross section, the walls of these pits tapered slightly becoming indistinct about 30 cm below the top. Each pit contained several sandstone cobbles that ranged in length between 9 and 20 cm. Pit 11A was situated adjacent to the west edge of Feature 6; 11B was located approximately 140 cm to the southwest of Feature 6. One bone-tool fragment (95-8-627) was found next to the top edge of pit 11A.

While no unequivocal function can be assigned to these two pit features, their shape, small size, and position with reference to a hearth (Feature 6), daub concentrations (Features 4, 5, and 12), and a storage pit (Feature 7) suggests that they were post holes for a large dwelling; the rocks may have served to wedge the upright posts in place. These pits are similar to Feature 21, also thought to be a post hole with rock wedges. Alternatively, 11A and 11B may represent the bottoms of larger pits excavated from higher in the soil profile.

Feature 12: Daub. This feature, located 24 m from Datum M2 at a bearing of S71°E, was identified in the A/B horizon of the Vaqueros paleosol between 91 and 101 cm below Datum A. The feature was a large concentration of baked soil measuring approximately 200 cm (east-west) x 100 cm (north-south). Composed of numerous individual lumps of fire-affected soil that ranged in length between 3 and 10 cm, the feature formed a nearly continuous layer, resting on the same stratigraphic surface. When the bottom of the baked-soil lumps were examined, they were found to contain numerous grass-leaf and large concave impressions, similar to those identified in Features 4 and 5. Due to the composition of the feature, it was interpreted as daub. The large concave impressions, possibly representing structural supports, were approximately 40 mm in width, and ran the length of the baked soil fragments. Other concave impressions, possibly representing wattle-work, consisted of multiple, parallel, molds approximately 5 to 6 mm in width. The impressions of blue-oak leaves and purple needlegrass were also identified in fragments of baked soil from Feature 12 (Appendix E).

Numerous fragments of calcined bone and flaked-stone debris were recovered from the baked-soil fragments, as well as, a single A1a, Spire-Lopped, *Olivella* bead. Identified bone included elements of snake, rabbit, squirrel, gopher, canid, and deer. Fish remains collected from the feature included two vertebrae; one unidentified and one surf perch. A flotation sample of baked soil (Sample 76) contained acorn, manzanita, wild cucumber, bay, buckeye, and virtually no small seeds. Four obsidian flakes collected from adjacent the feature, at the same stratigraphic level, produced the following rim values: 5.1 microns, Bodie Hills; 2.7, 3.3, and 4.9 microns, Napa Valley.

The morphological and spatial similarities between daub Features 4, 5, and 12 indicate that they may have been elements of the same structure. Nearby features, coinciding at the same stratigraphic level, included a hearth (Feature 6), possible post holes (Feature 11), and a storage pit (Feature 7), all of which may have been associated with a single domicile.

Feature 13: Rock Hearth. Feature 13 was located 60.8 m from Datum M3 at a bearing of S26°W, and was identified at the contact of the Vaqueros paleosol and Brentwood alluvium between 3 and 16 cm below Datum A. This feature was a discrete, roughly circular concentration of 65+ fire-affected sandstone cobbles that ranged in length between 5 and 15 cm. The cobbles were organized into a tight cluster, resting along a horizontal plane. A small, ground and pecked, sandstone slab (95-8-649) was adjacent to the south end of the feature. The arrangement of feature cobbles and the absence of additional sandstone in the surrounding matrix indicated that the feature was purposefully constructed, possibly as a hearth or similar processing feature. A flotation sample (Sample 100) collected from within the feature matrix contained a high frequency of acorn, and manzanita, as well as, smaller amounts of wild

cucumber, bay, buckeye, farewell-to-spring, red maids, goosefoot, peppergrass, tarweed, maygrass, fescue grass, sunflower, and bean.

Feature 14: Milling Equipment. Located 18.5 m from Datum M3 at a bearing of S16°W, this feature was identified in the Vaqueros paleosol at a depth of 126 cm below Datum A. The feature was composed of a unique block mortar (95-8-650) inverted over a large (50 x 30 x 8 cm) tabular sandstone cobble. The sides of the mortar appeared to have been removed, leaving only a shallow, oval-shaped depression bordered by irregular, broken edges. The sandstone cobble was unmodified. Lying perpendicular to the west edge of the mortar and cobble was a complete, cylindrical pestle (95-8-629). A siltstone core (95-8-628) was found approximately 20 cm east of the feature. Three fragments of medium to large mammal bone and a fragment of rabbit mandible were collected from under the sandstone cobble. It was not clear whether the milling equipment represented a discard pile or an intentional cache.

Feature 15: Refuse Scatter. This feature was located 16.6 m from Datum M3 at a bearing of S11°W and was identified in the Vaqueros paleosol at a depth of 99 cm below Datum A. The feature measured 120 cm (east-west) x 80 cm (north-south) and was composed of a concentration of 50+ fire-affected sandstone cobbles and 5 mortar fragments. The cobbles, ranging in length between 5 and 20 cm, were tightly clustered on the western side of the feature and more widespread along the eastern margin. The broad distribution and lack of organization indicated the feature was probably a refuse scatter deposited on a former occupation surface. The soil matrix within the feature contained numerous small fragments of baked soil, calcined bone, and charcoal. Fish remains recovered from the feature matrix included a Sacramento perch centrum and four unidentified vertebrae. A flotation sample (Sample 78), collected from the western edge of the feature, contained primarily large taxa, including acorn, manzanita, bay, and buckeye, as well as, a few small seeds of fiddleneck, farewell-to-spring, and maygrass.

Feature 16: Rock Hearth. Feature 16, located 31.3 m from Datum M3 at a bearing of S14°E, was identified in the A horizon of the Vaqueros paleosol between 101 and 117 cm below Datum A. The feature was made up of a concentration of 45+ fire-affected sandstone cobbles found in two distinct clusters. The cluster on the northwest edge of the feature was composed of 10+ large, tabular sandstone cobbles ranging in length between 15 and 50 cm. The cobbles were tightly spaced forming a roughly circular arrangement. The southeastern part of the feature included 35+ small, subangular, cobbles, ranging in length between 5 and 15 cm. These cobbles were loosely grouped, with the long axis of the cluster trending in a north-south direction. The organization and size segregation of the cobbles indicated that the rock concentration probably represented a hearth or similar cooking feature. A flotation sample (Sample 77), from matrix collected in the northwest part of the feature, contained acorn, manzanita, bay, buckeye, goosefoot, farewell-to-spring, hairgrass, bedstraw, fescue grass, sunflower, and sedge.

Feature 17: Refuse Scatter. Located 26.8 m from Datum M3 at a bearing of S11°W, this feature was identified in the Vaqueros paleosol between 96 and 110 cm below Datum A. The feature was made up of a concentration of 90+ unaltered and fire-affected sandstone cobbles, distributed over an area measuring approximately 200 cm (north-south) x 200 cm (east-west). The sandstone cobbles, ranging in length between 5 and 20 cm, were tightly clustered on the north, south, and west sides of the feature; intervening cobbles were more widely distributed. Interment of three burials (Burials 126, 129, 136) in the central portion of the rock concentration, may have bisected a once continuous "pavement." Based on a the extensive distribution and lack of organization, this feature is inferred to represent a refuse scatter, dispersed along a former occupation surface.

Faunal material recovered from the feature matrix included a Sacramento perch vertebra and fragments of artiodactyl, gopher, and medium and large mammal bone. Artifacts collected in and adjacent to the sandstone concentration included 1 quartz crystal 95-8-640), 1 A1a, Spire-Lopped, *Olivella* bead (-639), 1 chert core (-637), and several chert, siltstone, and quartzite flakes. A single Napa Valley obsidian flake (-634) from the southern end of the feature produced a mean hydration value of 3.3 microns. A flotation sample (Sample 79) recovered from the feature matrix contained a high

frequency of acorn, manzanita, bay, buckeye, and Coulter pine, as well as a variety of small taxa, including fiddleneck, farewell-to-spring, miner's lettuce, hairgrass, tarweed, phacelia, maygrass, sunflower, and sedge.

Feature 18: Refuse Pile. This Feature, located 35.0 m from Datum M3 at a bearing of S10°W, was identified in the Vaqueros paleosol at a maximum depth of 103 cm below Datum A. The feature was a small cluster of 8 fire-affected sandstone cobbles ranging in length between 5 and 35 cm. One of the feature rocks was a large pitted cobble fragment (-1413). The overall feature measured approximately 60 cm (north-south) x 50 cm (east-west). This feature may have been a pile of discarded cooking stones, although it was smaller than other refuse scatters found at the site.

Feature 19: Possible Daub. Feature 19 was located 29.2 m from Datum M3 at a bearing of S13°W. Identified in the Vaqueros paleosol between 92 and 102 cm below surface, the feature was made up of a concentration of baked soil measuring 50 cm in diameter. Composed of several individual lumps of fire-affected soil, the feature appeared similar to other daub concentrations (i.e., Features 4, 5, 12) found at the site, but no grass or other impressions were visible in the baked-soil pieces. One A1a, Spire-Lopped, *Olivella* bead (-616) and 1 chert biface midsection (-644) were found during exposure of the feature. A flotation sample (Sample 80) of baked soil contained acorn, manzanita, wild cucumber, bay, buckeye, and a sparse collection of small taxa, including fiddleneck, brome grass, goosefoot, farewell-to-spring, sunflower, and sedge.

Feature 20: Antler Cache/Work Surface. Located 37.3 m from Datum M3 at a bearing of S30°W, this feature was identified in the Vaqueros paleosol between 86 and 107 cm below Datum A. This unique feature was probably a work surface made up of two primary elements: (1) a widespread concentration of elk antler; and (2) a small organized cluster of rock, possibly representing a hearth (Figure III.33). Based on a count of basal elements, the antler aggregation was made up of a minimum of 16 individual deer, and 2 elk antlers. The majority of specimens were tine and medial fragments; at least three deer antlers were still attached to fragments of cranium. The antlers, tightly clustered near the center of the feature, were distributed over an area measuring approximately 400 cm north-south by 150 cm east-west. The rock concentration was composed of 50+ sandstone cobbles ranging in length between 5 and 10 cm. The tightly organized cobbles formed a roughly circular feature that measured approximately 70 cm in diameter. Although no clear stratigraphic break could be defined, both the rock and antler concentrations were distributed along a single horizontal plane, apparently marking a former occupation surface. Other feature-related artifacts found along this "surface" included 1 complete bone awl (95-8-614), 1 shouldered lanceolate projectile point (-612), 1 biface end (-613), 2 siltstone cores (-610, -611), and 1 type M1a *Olivella* bead fragment (-616). A variety of stone flaking debris was also collected from this same stratigraphic zone, including several pieces of siltsone, quartzite, dacite, chert, hornfels, petrified wood, and obsidian. Additional faunal remains from the feature included cottontail rabbit, jackrabbit, squirrel, ground squirrel, pocket gopher, black bear, coyote, bobcat, unidentified bird, and numerous fragments of artiodactyl bone. Obsidian-hydration analysis was conducted on the projectile point, biface fragment, and 4 obsidian flakes collected from the feature, producing the following rim values: 3.4, 2.6, 2.6. 2.6, 2.4 microns Napa Valley; and 0.9 micron Annadel. Over 1,000 grams of feature antler were sent for radiocarbon analysis (LVAP 61), but the sample was found to lack sufficient collagen to produce a suitable date.

Feature 21: Possible Post Hole. This feature, located 34.8 m from Datum M3 at a bearing of S30°W, was identified in the Vaqueros paleosol between 113 and 138 cm below Datum A. Feature 21 was made up of 4 sandstone cobbles and 1 bowl mortar fragment (-647), which appeared to be lining the edges of a small pit. The tabular cobbles and mortar fragment were aligned on edge in a circular arrangement. The total exterior diameter of the feature was 35 cm, while the roughly circular void within the cobbles measured approximately 20 cm in diameter. The organization of the feature cobbles indicated that they may have lined a post-hole pit, possibly used to wedge a structural support in place. Several fragments of medium/large mammal bone were collected from the feature exposure matrix.

Feature 22: Hearth. Feature 22, located 50 m from Datum M3 at a bearing of S22°W, was identified in the Vaqueros paleosol between 59 and 78 cm below Datum A. The feature was composed of a discrete patch of baked soil and fire-affected rock, measuring approximately 120 cm (north-south) x 60 cm (east-west). The baked soil formed a roughly circular patch, approximately 60 cm in diameter. Based on the gradual transition between the feature matrix and unaltered subsoil, the fire alteration appeared to have occurred in place, indicating that the feature may have functioned as a hearth. A diffuse scatter, composed of several sandstone cobbles (10+) and a pestle end-fragment (-648), was adjacent to the south end of the baked-soil feature. Several fragments of artiodactyl bone were found within the rock concentration. A flotation sample (Sample 81) of baked soil contained acorn, manzanita, bay, buckeye, and a sparse assemblage of small taxa, including goosefoot, miner's lettuce, and phacelia.

Feature 23: Milling Equipment. A small bowl mortar (-1405) and conical pestle-end (-1406), found 73 cm below Datum A in the Vaqueros paleosol, were designated Feature 23. The milling equipment was found 8.1 m from Datum A at a bearing of S29E. The complete, fully shaped mortar was found right-side-up, with the shaped conical pestle fragment lying adjacent to its south side. No other artifacts were associated with this feature.

Feature 24: Milling Equipment. This feature, located 61 m from Datum M3 at a bearing of S28°W, was identified in the Vaqueros paleosol at a depth of 58 cm below Datum A. The feature was composed of 2 large sandstone pestles (-1385, -1386)and a portion of a large sandstone bowl mortar (-1377). The pestles were found touching, lying parallel to each other, approximately 100 cm west of the bowl mortar. All three milling tools were found at the same stratigraphic level, indicating their association with a former occupation surface.

Feature 25: Milling Equipment. Three bifacial handstones (-1244, -1242, -1243) were identified in the Kellogg paleosol at a depth of 373 cm below Datum A. The handstones, located S14W at 35.7 m from Datum M3, were found tightly clustered in Unit W-1. Two handstones were lying next to each other while the third, was found resting on top of the other two, indicating that the artifacts may have been cached in a small pit.

North Locus

As a product of construction grading, seven features were identified in the North Locus of CCO-696. Although the monitoring phase was primarily focused on the identification and removal of human remains, when residential features were encountered, they were briefly described and provenience information was recorded. No flotation samples were collected.

Feature 26: Hearth and Faunal Bone. This Feature, located 80 m from Datum M4 at a bearing of N86°E, was located in the Vaqueros paleosol, 88 cm below Datum M5. The feature measured approximately 75 cm in diameter and was composed of a discrete ash deposit containing numerous charcoal flecks and small nodules of baked clay. Directly bordering the ash concentration were several fragments of unburned pronghorn bone, including cranium and cervical vertebrae. The feature appeared to be a hearth.

Feature 27: Hearth

Located 8 m from Datum M5 at a bearing of N13°E, this feature was identified in the Vaqueros paleosol at a depth of 126 cm below Datum M5. Interpreted as a hearth, the feature was made up of a discrete patch of baked soil and numerous charcoal flecks, measuring approximately 80 cm in diameter.

Feature 28: Pit. This feature, located 12 m from Datum M5 at a bearing of N5°E, was identified in the Vaqueros paleosol at a depth of 122 cm below Datum M5. The feature appeared to be a pit measuring 70 cm in diameter. The circular pit, filled with dark brown matrix containing numerous pieces of charcoal and calcined bone, was clearly visible in the culturally sterile, yellow-brown subsoil surrounding the feature.

Feature 29: Refuse Filled Pit. Feature 29 appeared to be a pit, located 14 m from Datum M5 at a bearing of N3°W, identified in the Vaqueros paleosol at a depth of 131 cm below Datum M5. The pit-fill, distinguished from the culturally sterile subsoil, was dark brown and contained numerous charcoal

flecks, pieces of freshwater mussel shell, and split long-bone fragments from a medium/large mammal. The feature was 70 cm in diameter.

Feature 30: Small Pit. This small pit was identified 133 cm below Datum M5 in the Vaqueros paleosol. The feature was located 10 m from Datum M5 at a bearing of N5°W. Smaller than the other pits from this locus, Feature 30 measured 45 cm in diameter. The dark brown pit-fill contained charcoal flecks and small lumps of baked soil.

Feature 31: Possible House Outline. This unique feature, located 18 m from Datum M5 at a bearing of N4°E, was identified in the Vaqueros paleosol between 140 and 155 cm below Datum M5. The feature, visible in the yellow-brown subsoil, was a 30-cm-wide band of dark brown soil that formed a half-circle; the western side had been destroyed by heavy equipment. The circular feature measured 210 cm in diameter. In cross section, the band of dark matrix was 15 cm deep and appeared roughly V-shaped. In plan-view, the feature was large enough to be the outline of a small house; the V-shaped trench may have been excavated to bury and support the ends of a structural framework.

Feature 32: Hearth. Located 54 m from Datum M5 at a bearing of N15°E, Feature 32 was identified in the Vaqueros paleosol at a depth of 175 cm below Datum M5. The feature was a roughly circular patch of baked soil measuring approximately 100 cm in diameter. Composed of a discrete concentration of fire-affected soil containing charcoal flecks and pieces of calcined bone, the feature was interpreted as a fire hearth.

Artifact Assemblage

Flaked Stone

Flaked-stone artifacts from CCO-696 include debitage, projectile points, bifaces, cores, cobble tools, core tools, and modified flakes. Large projectile points were relatively uncommon at the site, primarily represented by side-notched and concave-base points from the West Locus. Two large points were collected from the Deep Component, and 2 small projectile points were associated with burials found in the North Locus. Three of the 13 projectile points are chert (1 contracting stem, 1 concave base, and 1 side-notched); 2 are Annadel obsidian (1 shouldered lanceolate and 1 side-notched) and the remainder are Napa Valley obsidian.

Bifaces from the West Locus were made of a variety of material types including chert (11), slate (4), quartz (1), and obsidian (32 Napa Valley, 13 Bodie Hills, 2 Annadel). Bifaces from the East Locus were almost all obsidian, represented by 3 Bodie Hills, 2 Napa Valley, 1 Annadel, 1 Borax Lake, and 1 chert specimen. Only 2 obsidian bifaces—1 Bodie Hills and 1 Napa Valley—were recovered from the Deep Component.

Cores, predominantly siltstone and chert, were found in each of the four site loci. Modified flakes and core tools were only associated with the West Locus and the Deep Component, while cobble tools were only recovered from the North and West loci.

Flaked-stone debitage, collected from three components, was dominated by siltstone, chert, and obsidian. Obsidian debitage found in the East and West loci is from sources in the North Coast Ranges and eastern Sierra, while debitage from the Deep Component derives only from the North Coast Ranges.

Groundstone

A variety of groundstone tools were collected from CCO-696, including mortars, pestles, handstones, and millingslabs. With the exception of 8 graywacke pestles and 1 granite handstone, the vast majority of these artifacts were made of sandstone. In considering the distribution patterns, differences were identified in the frequency of types found in each of the four loci. Bowl mortars and unshaped pestles were most common in the East and West loci, while shaped pestles and small block mortars were the most common types collected from the North Locus. Further, handstones and millingslabs were the only milling tools recovered from the Deep Component.

Modified Cobbles

Modified cobbles included three primary types: battered, pitted, and miscellaneous. Battered cobbles were found in all four components, represented in a variety of material types. Pitted and miscellaneous cobbles were virtually all recovered from the West Locus.

Polished Stone

Polished stone artifacts from CCO-696 were found in the East and West loci. A bipointed, cylindrical schist "pencil" and a shaped, tabular item were found in the West Locus, while a single soapstone bead was recovered from the East Locus. Charmstones were collected from both the East and West Loci.

Minerals

Quartz crystals, iron oxide, and 3 lumps of coal were recovered from the site. One large double crystal was found in the eastern buried stream channel in the North Locus, while the other 6 crystals were found in the West Locus. The iron oxide and coal was only found in the West Locus.

Modified Bone

Several types of modified-bone artifacts were collected, primarily from the West and East loci. A serrated, large mammal-bone fragment, however, was found in the Deep Component.

Shell Beads and Ornaments

Five classes of *Olivella* beads, *Macoma* clam disk beads, and a *Haliotis* disk bead were collected from CCO-696. In addition, four types of Haliotis ornaments—including 23 oblong ornaments—were collected from the site. The majority of beads and ornaments were associated with burials found in the West Locus, although *Olivella* beads were also recovered from a cremation burial (Burial 157) found in the North Locus.

Baked Clay

In addition to the baked-clay features recorded in the West Locus, several individual lumps of baked clay were collected. Nearly 10% of the baked clay exhibited grass and other impressions similar to those found in the daub features from the site.

Faunal Bone

Frequencies of identified faunal material varied between the three sampled components. Faunal bone collected from the West Locus was dominated by medium mammal (51%), with large (35%) and small mammal (13%) making up approximately half of the assemblage. Bone collected from the East Locus was more evenly divided between large (44%), medium (34%), and small mammal (20%). In contrast with the other components, small mammal (47%) made up the highest proportion of identified bone from the Deep Component. Large mammal (40%) was also well represented, with medium mammal making up only 10% of the assemblage. Bird bone comprised approximately 1% of the identified bone in the East and West loci and almost 3% in the Deep component. Identified fish remains from CCO-696 are limited to resident freshwater species (Sacramento perch and Sacramento Squawfish), identified in the West Locus only.

Faunal Shell

The majority of shellfish collected from the site was made up of mostly unidentifiable freshwater mussel shell fragments; only one specimen could be identified as *Gonidea angulata*.

Chronological Data

Chronostratigraphy

Archaeological deposits at CCO-696 were associated with two buried soils. The Deep Component was contained in the Kellogg paleosol dated between 10,875 and 7255 cal B.P. The Vaqueros paleosol, dated between 6355 and 665 cal B.P., contained three components identified in the North, West, and East loci of the site. (See Site Stratigraphy and Formation Processes, above.)

Radiocarbon Dates

A total of 11 radiocarbon dates were obtained from cultural contexts at CCO-696, including 3 from the Deep Component, 1 from the North Locus, and 7 from the West Locus.

Dates from CCO-696 Deep ranged from 9870 to 7400 cal B.P. The date of 9870 cal B.P. derived from a concentration of charcoal found directly beneath a millingslab found between 390 and 415 cm. One date came from a large concentration of charcoal identified in the Ab horizon in Trench 7-27-1 at a depth between 320 and 375 cm, and the third date of 7440 cal. B.P. was obtained from charcoal collected from within the matrix of Burial 160, found between 325 and 380 cm.

Radiocarbon dates from the West Locus ranged from 2765 to 1320 cal B.P., with a mean date of 2084 B.P. Six dates derived from charcoal collected from burials (Burials 7, 30, 48, 73, 86, 139) found at depths of 139 to103 cm below surface. One date, from a depth of 132 cm below surface, was obtained from a large piece of charcoal associated with Feature 6.

Charcoal collected from cremation Burial 157 in the North Locus produced a radiocarbon date of 690 cal B.P. The burial was found in the Ab horizon of the Vaqueros paleosol at a depth of 126 cm below Datum M5.

Obsidian Hydration

A total of 121 hydration readings were obtained from CCO-696, including 13 from the Deep Component, 95 from the West Locus, 6 from the East Locus, and 2 from the North Locus. These included 92 Napa Valley, 18 Bodie Hills, 7 Annadel, and 5 Borax Lake obsidian specimens. The hydration results are as follows:

Deep Component:

11 Napa Valley, 6.9 to 1.3 microns
1 Bodie Hills, 3.3 microns
1 Annadel, 1.3 microns (converted)

West Locus:

77 Napa Valley, 4.9 to 1.7 microns
15 Bodie Hills, 5.1 to 1.8 microns
5 Borax Lake, 3.4 to 2.5 microns (converted)
3 Annadel, 1.6 to 1.3 microns (converted)

East Locus:

2 Napa Valley, 2.5 and 1.2 microns
2 Bodie Hills, 3.8 and 1.2 microns
2 Annadel, 1.6 and 1.4 microns (converted)

North Locus:

2 Napa Valley, 2.1 and 2.1 microns

Based on the Napa Valley obsidian hydration rate (Origer 1982), obsidian dates from the Deep Component ranged from 7300 to 260 B.P. Dates from the West Locus ranged from 3680 to 440 B.P, and dates from the East Locus were 960 and 220 B.P. The two samples from the North Locus produced identical dates of 680 B.P.

Projectile Points

Very few temporally diagnostic projectile points were collected from CCO-696. Wide Stem points, similar to the Napa Valley obsidian point found in the Deep Component, are known to date to the Lower Archaic in the southern North Coast Ranges (Fredrickson 1984:499; White and Fredrickson 1992:47). Consistent with a Lower Archaic assignment, the CCO-696 wide stem point produced a hydration reading of 6.9 microns (7400 B.P.).

Points found in the West Locus appear to date to the Middle and Upper Archaic periods. The lack of an established projectile-point chronology for central California, however, makes a more precise temporal assignment impossible. Napa Valley obsidian-hydration readings from 3 projectile points (2 side-notched and 1 concave base) found in the West Locus ranged from 4.5 to 3.8 microns (3100 to 2215 B.P.). Annadel points from the West Locus (1 side-notched and 1 shouldered lanceolate) produced hydration readings of 1.6 and 1.2 microns (converted).

Two Stockton Stemmed points, recovered from Burials 157 and 159 in the North Locus, date to the Emergent period (Fredrickson 1968:59; Fredrickson and Origer 1995). Hydration readings of 2.1 microns obtained from each of these points are consistent with an Emergent-period assignment.

Shell Beads

Marine-shell beads were collected only in the West and North loci of CCO-696. *Olivella* End-Gound beads were recovered from a single human cremation (Burial 157) found in the North Locus. According to Bennyhoff and Hughes (1987:121),these beads are most common in the Early period and Phase I of the Late period. Given the other temporal evidence from the North Locus, this bead lot clearly dates to the latter time period (1100 to 500 B.P.) (Bennyhoff and Hughes 1987: Scheme B1).

Over 4,000 shell beads were recovered from the West Locus of CCO-696, including specimens associated with 58 burials. Virtually all of the beads appear to date to the Early/Middle-period transition and the early Middle periods (2500 to 1900 B.P.). These included *Olivella* Spire-Lopped, Split, Saucer, and *Macoma* clam disk beads (Bennyhoff in Elsasser 1978:40; Bennyhoff and Hughes 1987:117, 123, 132). Only 3 beads (1 Square Saddle and 2 Thin Rectangles) found in the West Locus appear to be younger, dating to the Middle/Late-period transition (1300 to 1100 B.P.) (Bennyhoff and Hughes 1987: Scheme B1).

Summary of Chronological Data

Deep Component. The chronostratigraphy, 3 radiocarbon dates, and the wide-stem projectile point indicate that the Deep component at CCO-696 dates to the Lower Archaic period, approximately 9870 to 7400 cal B.P. The obsidian-hydration results, however, were primarily at odds with the other temporal indicators. In the absence of evidence for physical mixing between the Vaqueros and Kellogg paleosols, the obsidian associations seem to be good. Due to the strength of the other chronological information, it appears that the majority of the hydration readings do not accurately reflect the age of the deposit.

West Locus. Radiocarbon dates, obsidian-hydration results, and the shell-bead types indicate that the West Locus of CCO-696 was occupied from at least 2700 to 1320 B.P. While the shell beads and most of the radiocarbon dates suggest that the primary component dates to the first part of the Upper Archaic (2500 to 1800 B.P.), two of the radiocarbon dates and the bulk of the hydration readings provide evidence that the West Locus was used throughout the Upper Archaic.

East Locus. Only six hydration values provide temporal evidence from the East Locus. Despite the low number of hydration readings, the East Locus appears to be associated with the upper Archaic/Emergent-period transition based on obsidian dates ranging from approximately 1,000 to 200 B.P. The chronostratigraphic position of the component, however, indicates that it must be primarily older than 600 B.P.

North Locus. All of the chronological indicators from the North Locus, including a radiocarbon date, shell-bead types, and obsidian-hydration readings, indicate that the primary component is associated with the Emergent period. Based on the radiocarbon date and chronostratigraphy, the deposit probably dates between approximately 700 and 600 B.P.

TABLE III.5
COMPONENT ASSEMBLAGES CA-CCO-696

	South			
	West	East	North	Deep
Flaked Stone				
Small projectile points				
Stockton Stemmed	-	-	2	-
Large projectile points	-	-	-	-
Shouldered lanceolate	1	-	-	1
Contracting stem	1	-	-	-
Side-notched	4	-	-	-
Wide stem	-	-	-	1
Concave base	2	-	-	-
Bifaces				
End	12	-	-	-
Margin	16	2	-	-
Midsection	19	5	-	-
Tip	10	1	1	2
Complete	2	-	-	-
Large modified flakes				
Basalt	1	-	-	-
Chert	2	-	-	-
Dacite	1	-	-	-
Hornfels	1	-	-	-
Quartzite	2	-	-	1
Siltstone	-	-	-	1
Small modified flakes				
Chert	4	-	-	-
Obsidian	2	-	-	-
Cobble tool				
Chert	3	1	-	-
Dacite	1	-	-	-
Graywacke	1	-	-	-
Quartzite	4	1	-	-
Siltstone	1	-	-	-
Core tools				
Chert	1	-	-	1
Dacite	1	-	-	1
Siltstone	4	-	-	1
Bipolar core				
obsidian	1	-	-	-
Cores				
Basalt	1	-	-	-
Chert	12	2	1	6
Dacite	1	-	-	2
Granite	1	-	-	-
Petrified wood	1	-	-	-
Quartz	1	-	-	-
Quartzite	5	1	-	1
Siltstone	22	6	1	8

	South			
	West	East	North	Deep
Debitage				
Non-obsidian				
Andesite	4	2	-	-
Basalt	9	1	-	2
Chert	968	157	-	16
Dacite	105	13	-	6
Diorite	1	-	-	-
Gabbro	-	-	-	1
Granite	-	1	-	-
Graywacke	3	-	-	-
Hornfels	244	26	-	5
Petrified bone	2	1	-	-
Petrified wood	13	2	-	-
Quartz	58	5	-	-
Quartzite	228	31	-	1
Rhyolite	14	1	-	-
Schist	3	1	-	-
Serpentine	1	-	-	-
Siltstone	1,370	782	-	67
Slate	1	-	-	-
Obsidian				
Annadel	7	1	-	1
Bodie Hills	57	2	-	-
Borax Lake	6	-	-	-
Casa Diablo	-	1	-	-
Napa Valley	235	16	1	11
Groundstone				
Mortars				
Large bowl	6	1	1	-
Small bowl	3	1	1	-
Unique block mortar	1	-	-	-
Large block	2	-	-	-
Small block	1	-	4	-
Miniature mortar	2	-	-	-
Mortar fragment	4	-	-	-
Pestles				
Cylindrical	4	-	2	-
Slightly shaped	2	-	2	-
Conical	5	-	-	-
Cobble	12	2	-	-
Indeterminate	9	-	-	-
Millingslabs				
Unshaped	-	-	-	2
Possible Millingslab	-	1	-	1
Handstones				
Bifacial	-	-	-	6
Battered Cobble				
Andesite	1	-	-	-
Chert	7	-	-	-
Dacite	4	-	-	-
Granite	1	-	-	-

	South			
	West	East	North	Deep
Quartz	3	-	-	-
Quartzite	1	-	-	2
Schist	-	1	-	-
Siltstone	3	-	1	1
Pitted Cobble				
Single	8	-	-	-
Double	2	-	-	-
Polished Stone				
Bead	-	1	-	-
Bipointed cylindar	1	-	-	-
Tabular fragment	1	-	-	-
Charmstone	1	1	-	-
Miscellaneous Stone				
End-battered cobble	-	-	-	1
Pecked slab	3	-	-	-
Polished stone	1	-	-	-
Pecked cobbles	3	-	-	-
Unmodified obsidian pebble	1	-	-	-
Minerals				
Iron oxide	present	-	-	-
Quartz crystal	7	-	1	-
Coal	3	-	-	-
Fossil				
Oyster shell fragments	2	-	-	-
Branch/root	1	-	-	-
Modified Bone				
Distal antler	4	-	-	-
Bead	1	-	-	-
Bi-pointed pin	1	-	-	-
Curved-to-flat	1	1	-	-
Serrate	-	-	-	1
Single-pointed, blunt-tipped	-	1	-	-
Single-pointed, sharp-tipped	3	-	-	-
Shell Beads				
Olivella				
Spire-Lopped	1,412	-	-	-
End-Ground	-	-	47	-
Split	180	-	-	-
Square Saddle	1	-	-	-
Saucer	3,143	-	-	-
Thin Rectangle	2	-	-	-
Fragments	44	-	-	-
Macoma				
Disk	123	-	-	-
Haliotis				
Disk	1	-	-	-
Shell Ornaments				
Haliotis				
Rim	4	-	-	-
Oblong	23	-	-	-
Circular	1	-	-	-
Oval	1	-	-	-
Unidentified	1	-	-	-

	South			
	West	East	North	Deep
Faunal				
Mammal/bird bone	11,697	712	-	123
Freshwater mussel shell fragments	718	11	-	1
Marine shell fragments	1	-	-	1
Baked Clay				
Impressed	22	-	-	-
Lumps	226	-	-	-

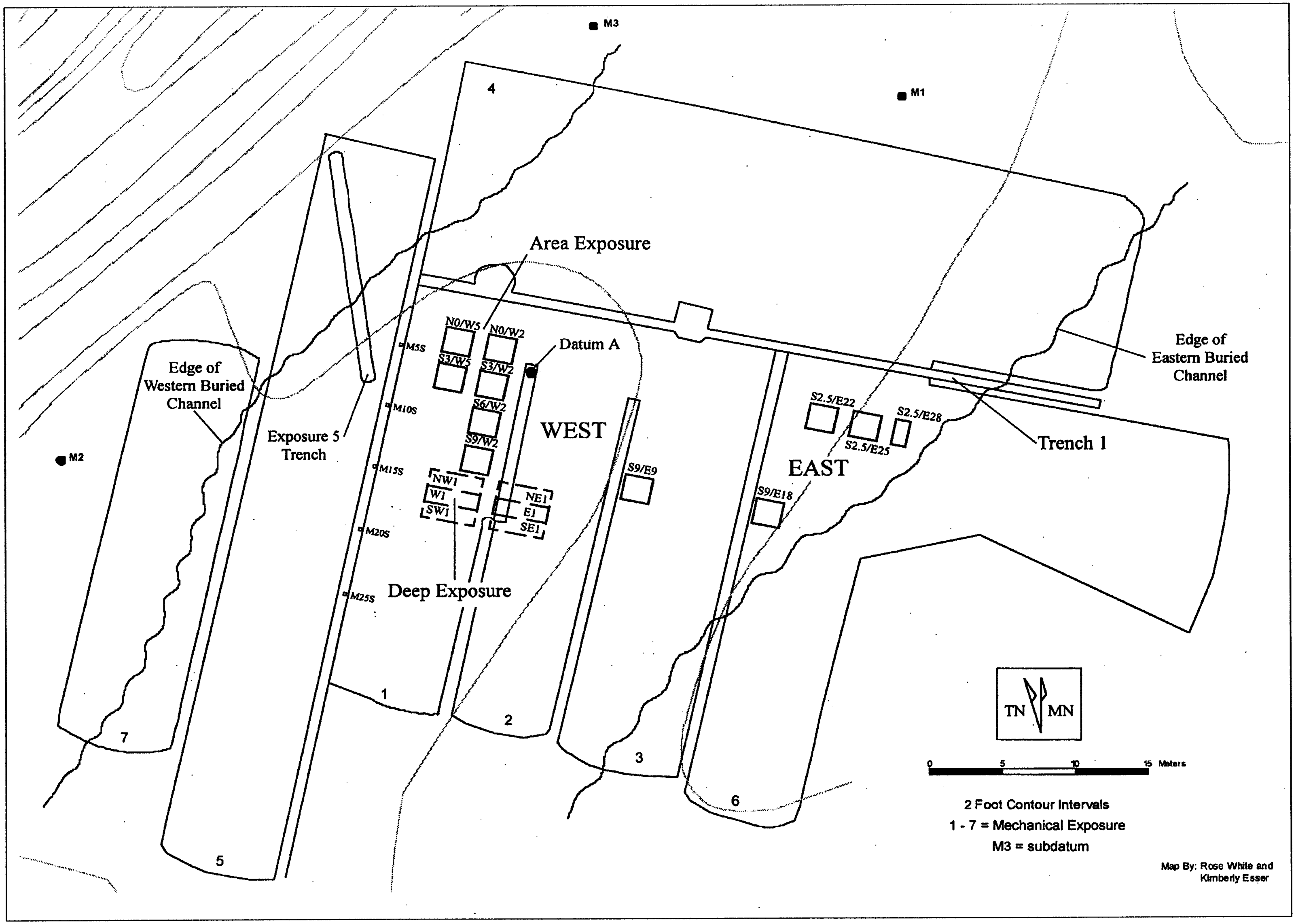


Figure III.23. Area Exposure at CA-CCO-696, Los Vaqueros Project

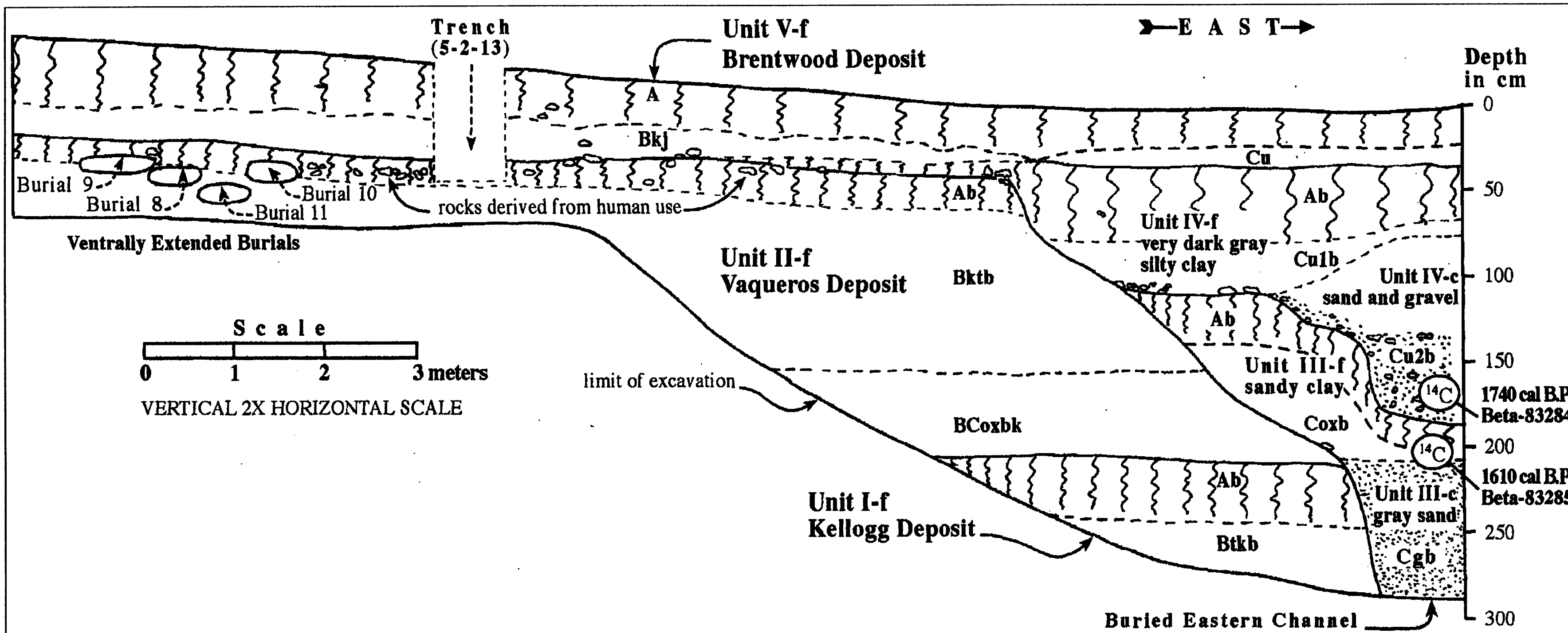


Figure III.24. East Section of Trench 1 Showing Portion of East Locus and Buried Eastern Channel at CA-CCO-696

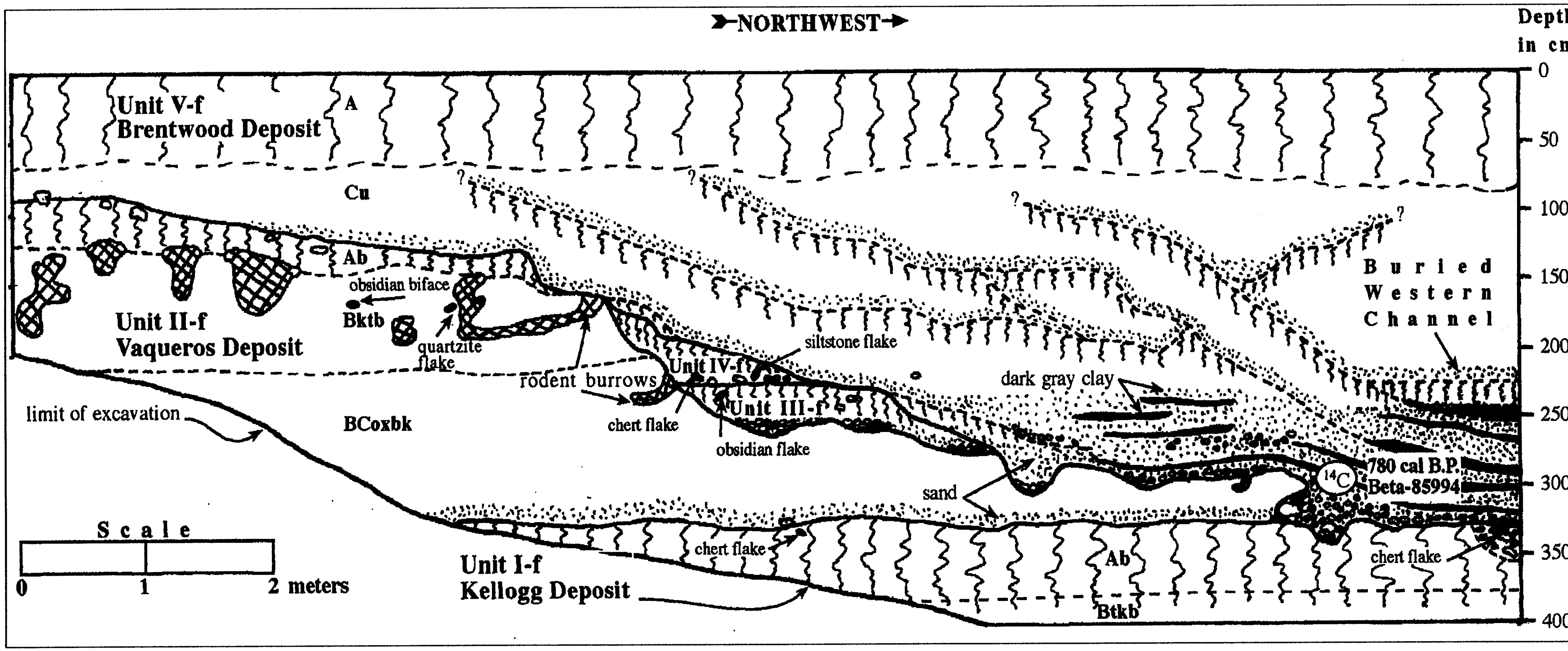


Figure III.25. Profile of Trench in Exposure 5 at CA-CCO-696

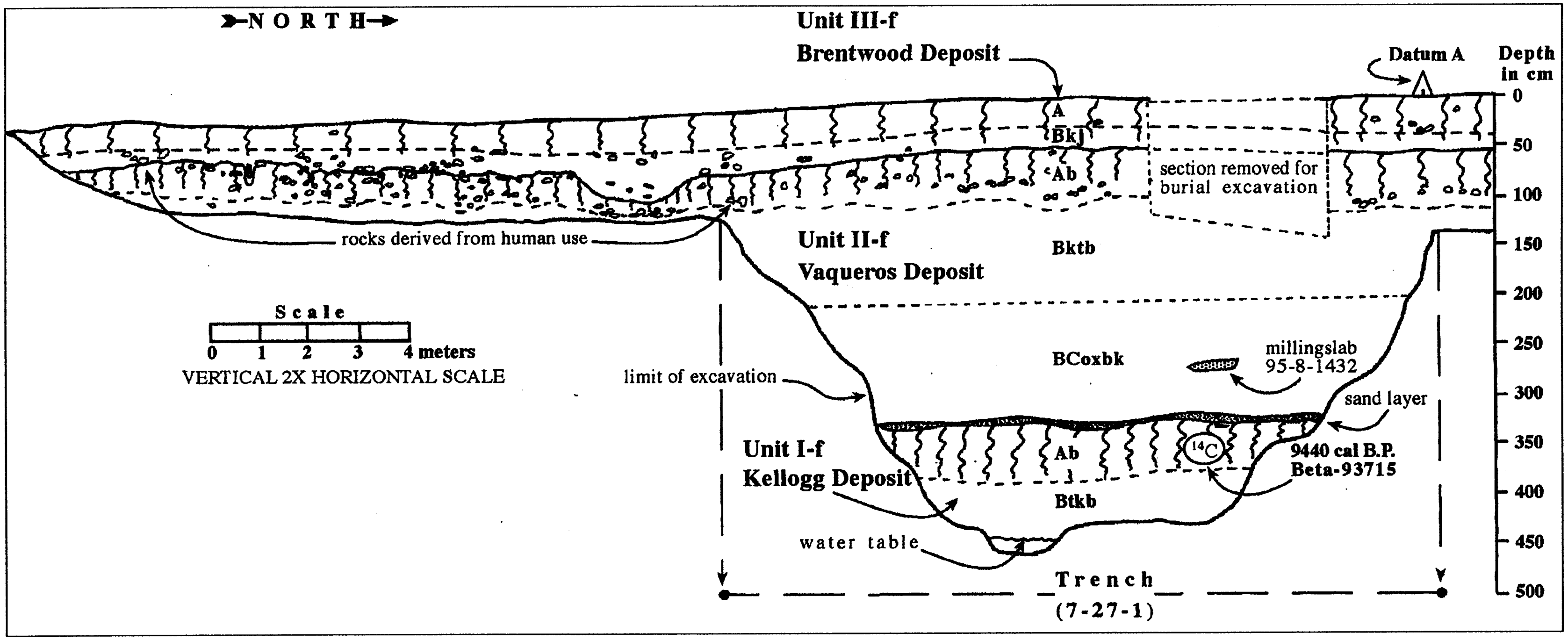


Figure III.26. Profile of 1–2 Balk and Trench 7-27-1 at CA-CCO-696

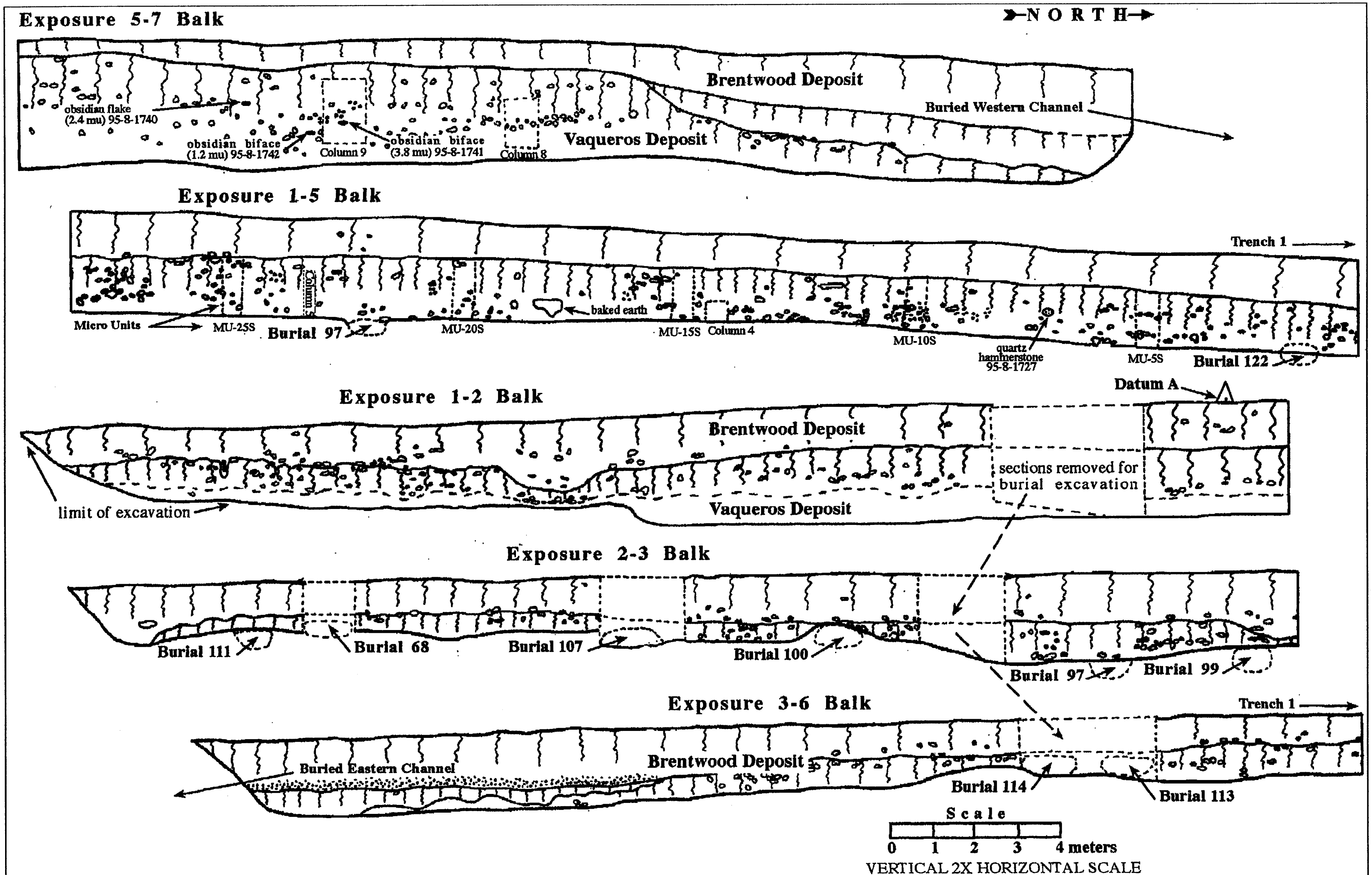


Figure III.27. All Exposure Profiles at CA-CCO-696, Los Vaqueros Project

Figure III.28. Distribution of Human Burials at CA-CCO-696, Los Vaqueros Project

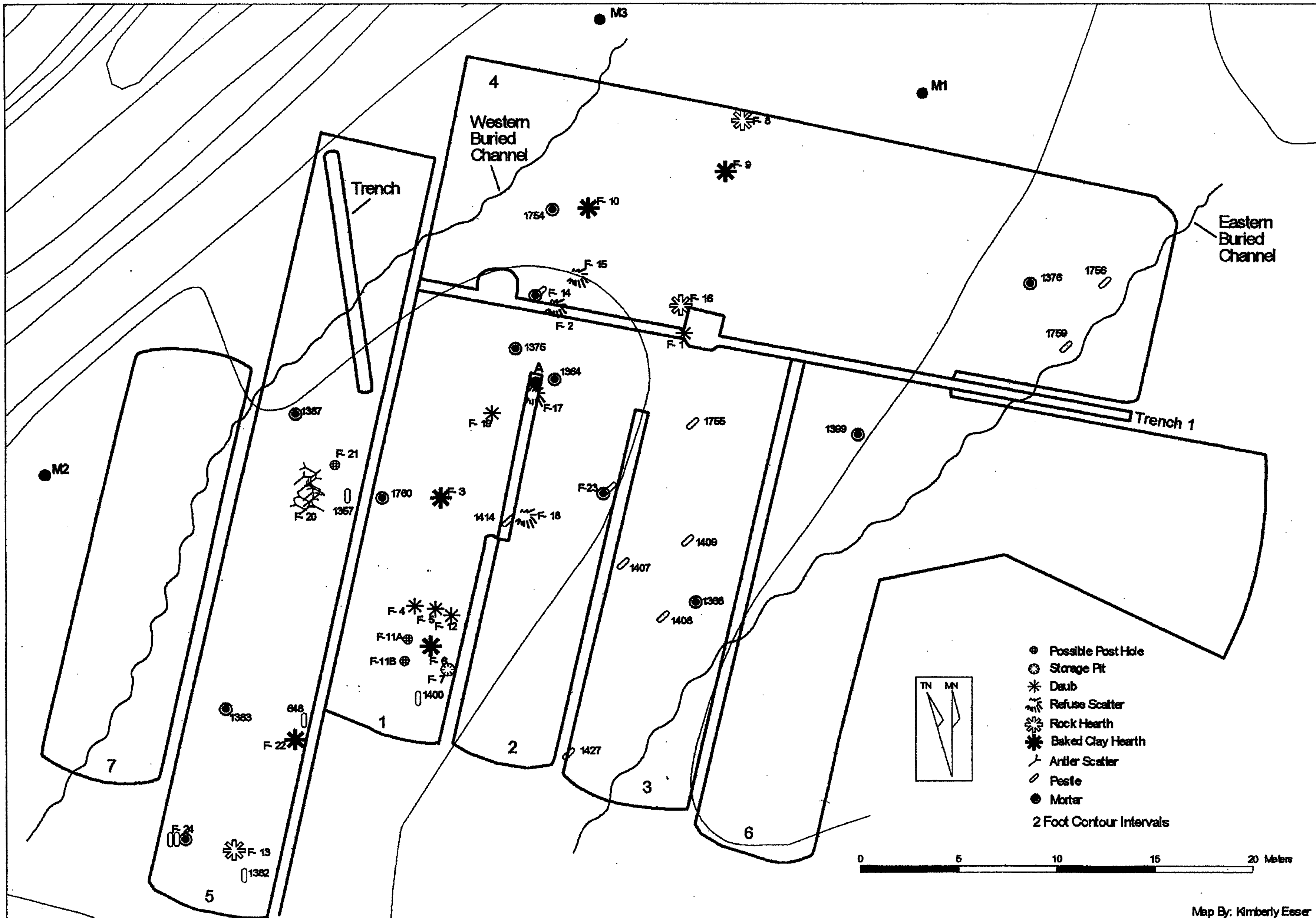


Figure III.29. Distribution of Archaeological Features at CA-CCO-696, Los Vaqueros Project

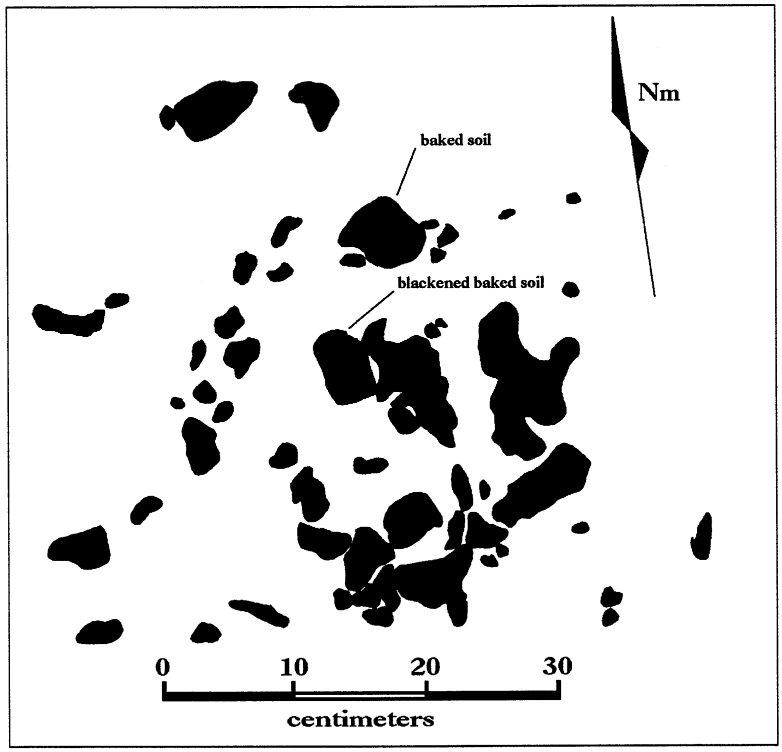


Figure III.30. Feature 1 (possible daub concentration) at CA-CCO-696

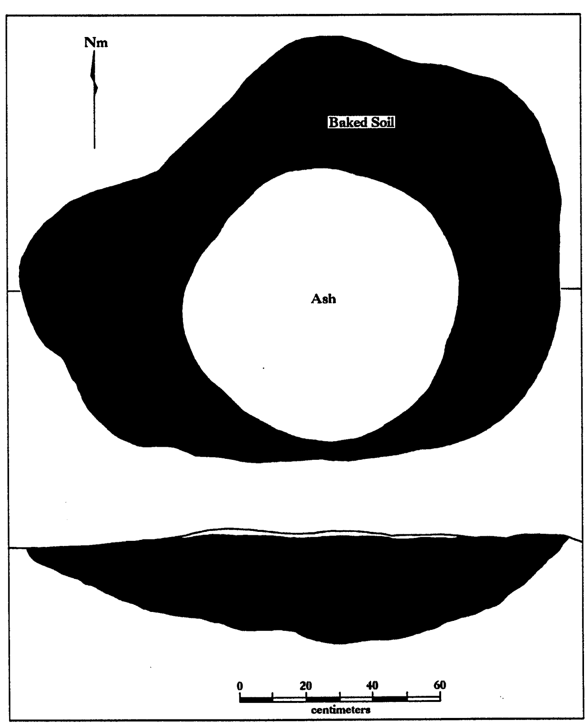


Figure III.31. Feature 3 (hearth) at CA-CCO-696

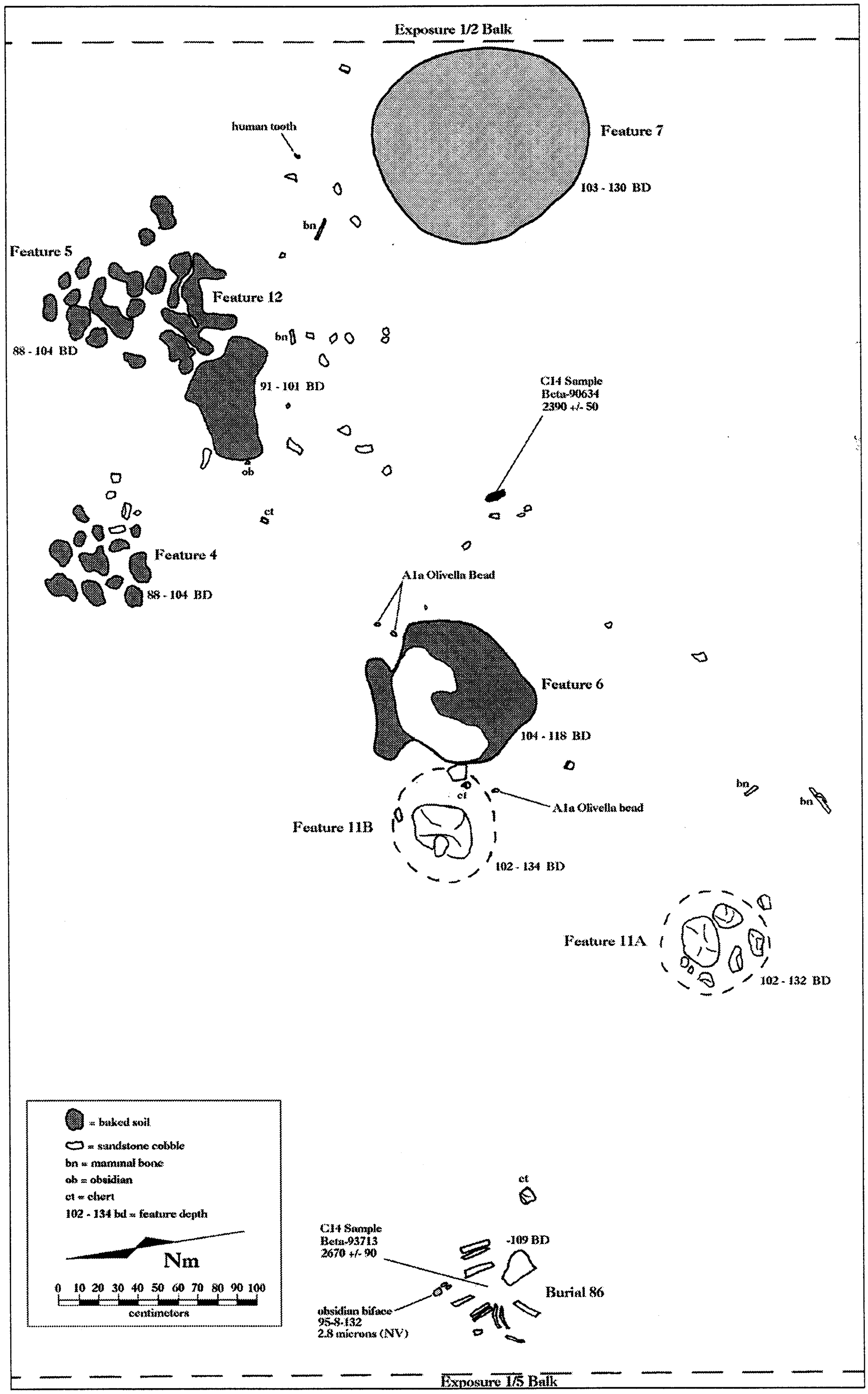


Figure III.32. Feature Concentration at CA-CCO-696. Included are daub concentrations (Features 4 and 5), a hearth (Feature 6), possible post holes (Feature 11), and a storage pit (Feature 7), all of which may have been associated with a single domicile.

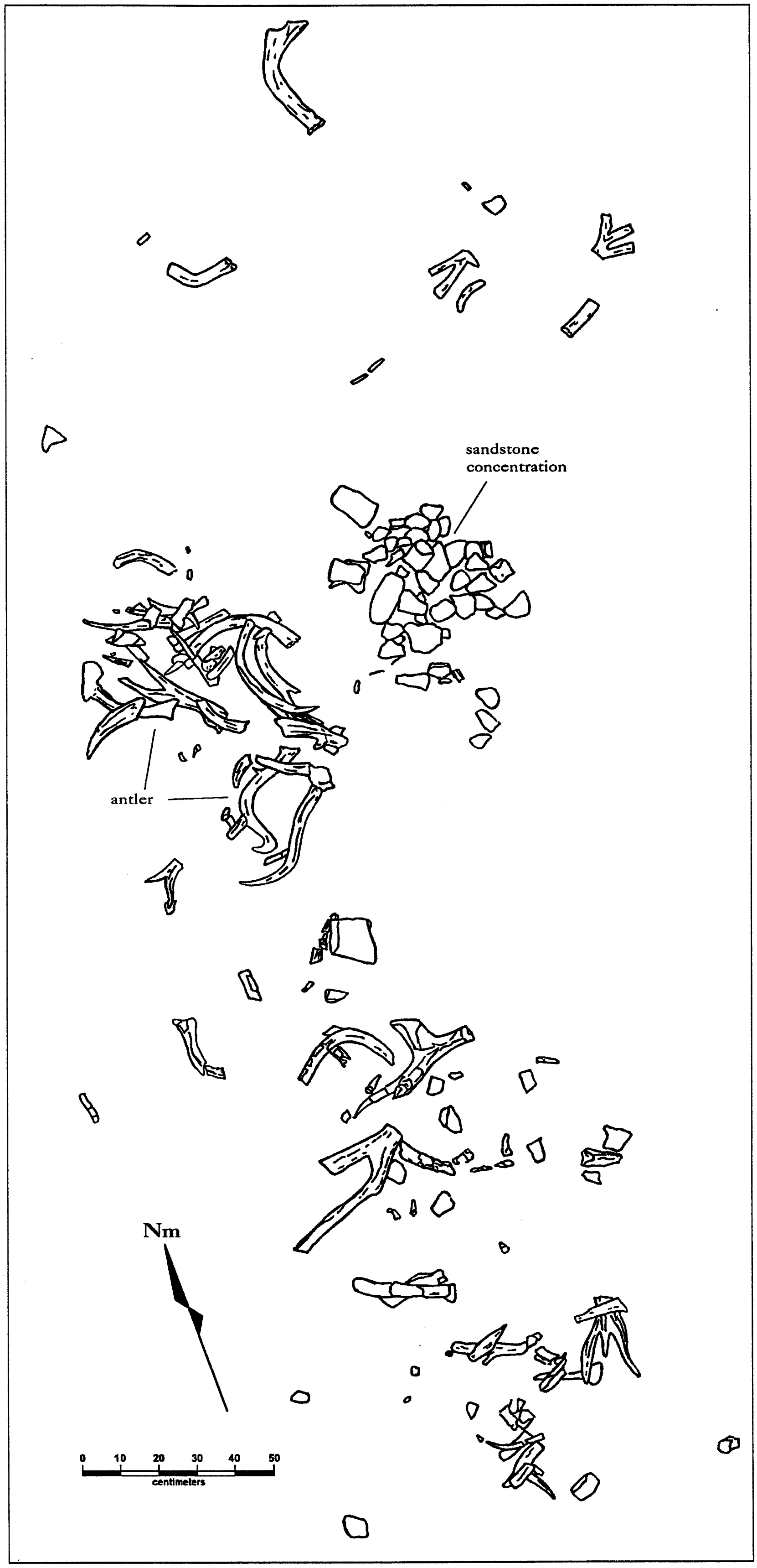


Figure III.33. Feature 20 (antler cache/work surface) at CA-CCO-696

PART IV

DESCRIPTIVE STUDIES

CHAPTER 7

ARTIFACTS FROM LOS VAQUEROS PROJECT SITES

FLAKED-STONE ARTIFACTS

Eight categories of flaked-stone artifacts were identified in the Los Vaqueros prehistoric archaeological investigations. The most numerous category was flaked-stone debris, or debitage (n = 22,796), comprising 97.6 % of all recovered flaked-stone items. Formed artifacts consist of 559 items representing the following categories:

	n	%
Projectile points	159	28
Bifaces	176	31
Cores	115	21
Bipolar cores	15	3
Core tools	13	2
Cobble tools	16	3
Modified flakes	68	12

Descriptive attributes were recorded for each formed artifact (e.g., length, width, thickness, weight, portion). Additional nonmetric artifact-specific characteristics were also recorded. The collection is described by artifact class below. Tables summarizing metric information are provided for the more formal artifact categories, while unique or representative items are illustrated. Metric and provenience data for all individual artifacts are presented in Appendix C by artifact category.

FLAKED-STONE DEBRIS

A total of 22,793 pieces of stone flaking debris were recovered. Four material types dominated the collection: siltstone (n = 14,431, 63.3%); obsidian (n = 3,757, 16.5%); chert (n = 2,098, 9.2%); and quartzite (n = 1,759, 7.7%). Eighteen different material types made up the remaining 3.3% (n = 748) of the collection. Table IV.1 provides a summary of all stone flaking debris by material type, count, weight, frequency, and site. A discussion of the technological attributes of the obsidian debitage is presented under Obsidian Analysis in Chapter 8.

PROJECTILE POINTS

Of the 159 identified projectile points and point fragments, there were 143 obsidian specimens (90%), 13 chert (8%), and 1 each of quartz, quartzite, and petrified wood. A primary distinction was made based on size and inferred function. Small projectile points with complete or reconstructed weights of less than 3 grams were considered arrowpoints. Large projectile points with actual or reconstructed weights greater than 4 grams were considered to be dart/spear points.

For each projectile point, the following measurements were recorded wherever applicable: length, width, thickness, weight, neck width, stem width, stem length, notch width, notch depth, proximal and distal shoulder angles, and number of arrises (ridges bordering flake scars) per centimeter. For serrated specimens, the maximum serration size and minimum number of serrations along a single margin were also recorded.

TABLE IV.1
DISTRIBUTION OF FLAKED-STONE DEBRIS BY MATERIAL

Material	Total	Total	458			459			637			696		
	n	wt. (g)	n	n (%)	wt. (g)	n	n (%)	wt. (g)	n	n (%)	wt. (g)	n	n (%)	wt. (g)
Andesite	9	167.7	3	0.02	77.5	-	-	-	-	-	-	6	0.13	90.2
Basalt	87	611.2	36	0.02	176.2	1	0.46	73.0	38	5.64	214.2	12	0.27	147.8
Chalcedony	3	2.5	1	0.01	0.3	-	-	-	-	-	-	2	0.04	2.2
Chert	2098	5913.59	645	3.70	1511.1	32	14.88	82.4	262	38.87	612.2	1139	25.37	3657.3
Dacite	148	1993.85	7	0.04	24.4	2	0.93	28.6	5	0.74	118.7	129	2.87	1741.65
Diorite	2	3.8	1	0.01	2.0	-	-	-	-	-	-	1	0.02	1.8
Gabbro	1	2.5	-	-	-	-	-	-	-	-	-	1	0.02	2.5
Granite	4	14.2	1	0.01	5.3	-	-	-	2	0.29	4.7	1	0.02	4.2
Graywacke	4	137	1	0.01	3.4	-	-	-	-	-	-	3	0.07	133.6
Hornfels	291	2697.4	6	0.04	61.1	-	-	-	10	1.48	154.1	275	6.12	2482.2
Obsidian	3757	1139.67	3318	19.00	982.0	20	9.30	6.1	61	9.05	24.05	339	7.55	119.07
Petrified bone	3	2.8	-	-	-	-	-	-	-	-	-	3	0.07	2.8
Petrified wood	34	122.6	10	0.06	16.4	2	0.93	3.5	7	1.03	63.5	15	0.33	39.2
Quartz	108	392.05	41	0.23	119.2	-	-	-	4	0.59	22.3	63	1.40	250.55
Quartzite	1759	6999.05	1406	8.11	4609.7	2	0.93	1.1	76	11.27	834.2	260	5.79	1421.35
Rhyolite	19	373.9	2	0.01	42.0	-	-	-	2	0.29	11.5	15	0.33	320.4
Schist	5	94	-	-	-	-	-	-	-	-	-	5	0.11	94
Serpentine	1	1.2	-	-	-	-	-	-	-	-	-	1	0.02	1.2
Siltstone	14431	37670.8	11843	68.27	21948.5	156	72.56	1017.6	205	30.42	1270.6	2219	49.42	13311.6
Slate	2	7	-	-	-	-	-	-	1	0.15	5.8	1	0.02	1.2
Soapstone	1	1.8	-	-	-	-	-	-	1	0.15	1.8	-	-	-
Unknown	26	481.5	26	0.15	481.5	-	-	-	-	-	-	-	-	-
Total	**22793.0**	**58830.1**	17347	100.00	30060.6	215	100.00	1212.3	674	100.00	3337.65	4490	100.00	23824.82

(*Note:* Not included are CCO-447, with 8 flakes; CCO-468, with 13 flakes; and CCO-636, with 47 flakes; see Site Reports.)

Small Projectile Points

A total of 143 specimens (90% of the total projectile-point collection) were defined as arrowpoints and segregated into three groups by series/type: Stockton series, Desert Side Notched, and Panoche Side Notched. Table IV.2 provides summary metric information for all Small projectile points. Selected Small projectile points are illustrated in Figure IV.1.

Stockton Series

A total of 132 classifiable Stockton series projectile points were recovered. Of these, 87 were complete specimens or basal fragments could be divided into three types based on hafting attributes—corner notched, side notched, and stemmed—and a fourth type, assumed to be a Stockton preform. Based on diagnostic serrations, 45 untypable fragments (blade and distal portions) were included as Stockton series points. All complete and fragmentary specimens were obsidian, including 120 Napa Valley (91%), 6 Annadel, 4 Bodie Hills, 1 Borax Lake, and 1 item of unidentified obsidian.

Complete specimens weighed less than 2.8 g and ranged in length between 13.6 mm and 57.6 mm, in width between 9.2 and 23.8 mm, and in thickness between 2.4 and 5.5 mm. The majority (81.5%) of complete and conditionally complete Stockton series points had serrations. Specimens lacking serrations were either probable preforms or appeared to be reworked or damaged.

Stockton Corner Notched. A total of 5 corner-notched points, all basal fragments, were recovered, including 4 Napa Valley items and 1 unknown obsidian specimen. The recovered corner-notched points had expanding stems with a mean proximal shoulder angle (PSA) of 124 degrees. One unique basal fragment (95-2-2807) was relatively large and retained a patch of cortex at the base, apparently representing the striking platform of the original flake.

Stockton Side Notched. A total of 59 side-notched points were recovered, including 55 Napa Valley specimens (93.2%) and 2 each Annadel and 2 Bodie Hills. This type was represented by 11 complete (19%) and 10 conditionally complete points (17%), 37 basal fragments (63%), and 1 margin. Stockton Side Notched points constituted 60% of the total typable arrowpoints.

In outline, these points were lanceolate shaped, with flat to convex bases. Intrusive notches formed serrations, which averaged 1.8 per margin. The widest portion of the point was either just below or just above the basal notches; the specimens had a mean PSA of 150 degrees. Side-notched points tended to be small with complete specimens ranging in weight between 0.4 and 1.6 grams, in length between 15.9 mm and 36.4 mm, and in thickness between 3.2 and 5.4 mm. Basal elements were short with the stem width averaging nearly twice the length (length = 5.9, width = 10.6).

Stockton Stemmed. A total of 18 stemmed points were recovered, including 13 Napa Valley specimens (72.2%), 2 Annadel, 2 Bodie Hills, and 1 Borax Lake. This type was represented by 7 complete specimens, 1 conditionally complete specimen, and 10 basal fragments. Stemmed points made up 13% of the total typable arrowpoints. These points had slightly contracting to expanding stems, with PSAs ranging from 70 to 140 degrees. Basal morphology varied from flat to convex. Serrations tended to be well defined, averaging 3.7 per margin.

Stockton Preform. A total of 5 Napa Valley obsidian preforms were recovered, including 3 conditionally complete specimens and 2 basal fragments. In outline these points were lanceolate shaped. They lacked hafting elements, as well as the serrations found on other Stockton series points. Two specimens were minimally modified flakes, displaying only minor exterior retouch, and 2 specimens retained patches of cortex on their dorsal surfaces.

Stockton series fragments. A total of 45 Stockton series fragments were recovered, including 43 Napa Valley specimens (95.6%) and 1 each of Annadel and Bodie Hills. Fragments made up 34% of the total Stockton series points and included 11 margins (24%), 19 midsections (42%), and 15 tips (33%).

Spatial and Temporal Distribution

A total of 129 (97.7%) complete and/or fragmentary Stockton series points were recovered from the Brentwood alluvium. Two Stockton Stemmed points and 1 tip were recovered from the Vaqueros paleosol. A total of 124 (93.9%) of the specimens was collected from CCO-458 West, 4 were collected

TABLE IV.2
SMALL PROJECTILE POINTS, SUMMARY METRIC DATA

	Total	Lngth	Wdth	Thcknss	Wght (g)	Nck Wdth	Stm Wdth	Serr. #	Serr. Size	Stm Lngth
Desert Side Notched	4									
Number		3	4	4	3	4	4	-	-	4
Mean		24.9	13.5	4.1	1.2	7.3	12.8	-	-	4.1
s.d.		4.2	1.7	1.2	0.6	1.8	1.2	-	-	0.4
Minimum		20.1	11.4	2.9	0.6	6.3	11.4	-	-	3.6
Maximum		27.7	15.6	5.5	1.6	9.4	4.4	-	-	4.4
Panoche Side Notched	7									
Number		4	4	4	4	4	4	-	-	4
Mean		23.8	13.1	4.3	1.0	5.2	12.9	-	-	6.6
s.d.		3.0	1.7	0.8	0.3	0.2	2.0	-	-	1.1
Minimum		20.9	11.1	3.5	0.7	5.1	10.3	-	-	5.1
Maximum		27.9	14.9	5.1	1.4	5.4	14.9	-	-	7.6
Stockton Side Notched	59									
Number		20	20	20	20	20	20	18	18	20
Mean		22.5	11.5	3.9	0.9	8.9	10.6	1.8	1.3	5.9
s.d.		5.1	1.1	0.7	0.4	1.4	1.1	1.2	0.3	1.7
Minimum		15.9	9.6	3.2	0.4	5.9	7.6	1.0	0.6	3.5
Maximum		36.4	13.2	5.4	1.6	11.4	12.7	5.0	1.9	10.1
Stockton Stemmed	18									
Number		7	7	7	7	7	7	6	6	7
Mean		26.1	12.7	3.9	1.1	8.0	7.7	3.7	1.2	5.4
s.d.		14.5	1.7	1.0	0.8	1.4	0.7	3.7	0.5	1.6
Minimum		13.6	10.7	2.7	0.3	6.2	6.6	1.0	0.4	2.4
Maximum		57.6	14.9	5.4	2.7	9.9	8.5	11.0	1.8	7.2
Stockton Corner Notched	5									
Number		-	5	5	5	5	5	3	2	5
Mean		-	13.6	3.2	0.6	7.5	8.7	1	2.1	4.4
s.d.		-	5.4	1.2	0.8	3.5	5	0	2.4	1.5
Minimum		-	9.2	2.4	0.1	5.3	1.1	1	0.4	2.4
Maximum		-	23.8	5.5	2.3	14.6	16.7	1	3.8	5.6
Stockton Preform	5									
Number		3	3	3	3	-	-	-	-	-
Mean		18.2	13.1	3.5	0.8	-	-	-	-	-
s.d.		0.9	1.3	0.8	0.2	-	-	-	-	-
Minimum		17.4	11.9	2.7	0.7	-	-	-	-	-
Maximum		19.3	14.4	4.4	1.0	-	-	-	-	-

from CCO-468, 3 were from CCO-696 North, and 1 from CCO-636. Side-notched points were recovered from Feature 9 (n = 2), Feature 10 (n = 1), and Burial 2 (n = 1) at CCO-458. Stemmed points were recovered from Feature 1 (n = 1) and Feature 2 (n = 1) at CCO-458. Two stemmed points were recovered from CCO-696 North: 1 associated with Burial 157 and 1 associated with Burial 159.

A total of 17 specimens produced usable hydration values, including 2 Bodie Hills and 15 Napa Valley obsidian specimens. Napa Valley hydration values averaged 1.8 microns and ranged between 1.0 and 3.0 microns. Bodie Hills hydration values averaged 2.3 microns and ranged between 1.8 and 2.9 microns. A stemmed point associated with Burial 157 at CCO-696 North was radiocarbon-dated 690 cal B.P. Stockton serrated points were recovered from components radiocarbon-dated between 690 and 465 cal B.P.

Desert Side Notched

A total of 4 Desert Side Notched (DSNs) points were recovered—2 Napa Valley obsidian specimens and 2 chert specimens. The collection included 1 complete point, 2 conditionally complete points, and 1 basal portion. These points were triangular in outline, had concave bases, and were notched low along the margins. One obsidian point (95-2-942) lacking well-defined notches was tentatively classified as a DSN. Two chert specimens (95-2-78, -79) with V-shaped basal concavities were similar to the Delta subtype identified by Baumhoff and Byrne (1958:38). The single complete specimen (92-2-79), however, was slightly shorter (20.1 mm) than the minimum length (>27 mm) defined for the Delta subtype. One obsidian specimen (95-2-101) with a slightly arching base was similar to the General subtype, but was slightly longer (27.7 mm) than the maximum length (26 mm) defined for that subtype.

Spatial and Temporal Distribution. All of the DSN points were recovered from the Brentwood alluvium at CCO-458 West. Hydration values for the 2 Napa Valley specimens were 1.7 and 2.0 microns. DSNs were recovered from components radiocarbon-dated between 690 and 465 cal B.P.

Panoche Side Notched

A total of 7 Panoche Side Notched points was recovered, including 6 chert specimens and 1 of petrified wood. The Panoche Side Notched classification follows Olsen and Payen (1968:17). The collection included 3 complete, 1 conditionally complete, and 3 basal portions. Similar in appearance to DSNs, the Panoche specimens were triangular-shaped, with shallow concave bases and well-defined side notches. In contrast, however, they had wider notches, narrower neck widths, and tended to be notched higher up the margins than any of the DSN specimens.

Spatial and Temporal Distribution. All of the Panoche Side Notched points were recovered from the Brentwood alluvium at CCO-458 West. Panoche Side-Notched points were recovered from components radiocarbon-dated between 690 and 465 cal B.P.

Large Projectile Points

A total of 16 specimens (only 10% of the total projectile-point colleciton) were defined as dart/spear points. They were classified into six types: Shouldered Lanceolate, Concave Base, Leaf Shaped, Side Notched, Expanding Stem, and Wide Stem. Table IV.3 provides summary metric data for the Large projectile points. Selected Large points are illustrated in Figure IV.2.

Leaf Shaped

A total of 2 complete leaf-shaped points were recovered, 1 Annadel obsidian specimen and 1 of quartz. Leaf-shaped points made up 12.5% of the total Large point collection. These points were very similar in length (49.7, 51.4 mm), width (20.5, 18.4 mm), and thickness (10.6, 10.5 mm). The quartz item weighed slightly more (11.2 g) than the obsidian (8.7 g). The Annadel specimen (95-7-395) was biconvex in cross section and had well-defined serrations (see Figure IV.2). The quartz specimen (95-2-687) was basally thinned and appeared plano-convex in cross section.

Spatial and Temporal Distribution. The quartz point was recovered from the Brentwood alluvium at CCO-458 West, the obsidian point from soil Unit I at CCO-637. Specimen 95-7-395 was submitted for obsidian-hydration analysis; it produced a diffuse hydration band. The leaf-shaped points were recovered from components radiocarbon-dated between 2765 and 465 cal B.P.

TABLE IV.3
LARGE PROJECTILE POINTS, SUMMARY METRIC DATA

Type	n	Lngth*	Wdth	Thcknss	Ntch Wdth	Ntch Dpth	Nck Wdth	Stm Wdth	Stm Lngth
Concave Base	2	28.3	21	8.1	10.8	4.3	-	-	-
Leaf Shaped	2	50.6	19.5	10.6	-	-	-	-	-
Shouldered Lanceolate	2	49.7	27.9	8.4	-	-	-	-	-
Contracting Stem	1	40.9	19.9	5.9	-	-	11.6	11.1	11.5
Wide Stem	1	63.6	34.1	13.9	-	-	22.4	22.6	12.7
Expanding Stem	1	31.5	21.5	5.6	11.5	2.5	15.1	19.6	13.3
Large Side Notched	7	43.4	19.0	8.5	5.9	1.3	13.4	14.4	11.6

*Includes incomplete measurements.

Contracting Stem

A single chert contracting-stem point was recovered (Figure IV.2). The complete specimen (95-8-144) weighed 4.4 g, had a PSA of 80 degrees, and measured 40.9 mm in length, 19.9 mm in width, and 5.9 mm in thickness. The point had well-defined shoulders and, at the base, retained the striking platform of the original flake. The blade element appeared slightly reworked.

Spatial and Temporal Distribution. Specimen 95-8-144 was recovered from the Vaqueros paleosol in CCO-696 South. The projectile point was associated with Burial 107 in a component radiocarbon-dated between 2765 and 1320 cal B.P.

Expanding Stem

One quartzite base was classified as an expanding-stem projectile point. Specimen 95-7-232 weighed 5.0 g, had a PSA of 110 degrees, and measured 31.5 mm in length, 21.5 mm in width, and 5.6 mm in thickness. The blade element had parallel margins and broad, asymmetrical side-notches that created an expanding stem. Basal thinning resulted in a concave base. It is illustrated in Figure IV.2.

Spatial and Temporal Distribution. Specimen 95-7-232 was recovered from soil Unit I at CCO-637. The specimen was associated with a component radiocarbon-dated between 2585 and 690 cal B.P.

Shouldered Lanceolate

A total of 2 complete shouldered lanceolate points were recovered, including 1 Annadel (95-8-612) and 1 Napa Valley (95-8-2019) obsidian specimen. Shouldered lanceolates made up 12.5% of the total Large-projectile-point collection. These specimens weighed 14.4 and 8.5 g and measured 49.1 and 50.3 mm long, 25.4 and 30.4 mm wide, and 7.5 and 9.3 mm thick. Both specimens had well-defined shoulders and were biconvex in cross section. The thickness:width ratio for each was nearly identical (0.30 and 0.31). Specimen -612 was reworked above the shoulders; at the base, it retained the striking platform of the original flake (Figure IV.2). Below the shoulders of specimen -2019, the margins appeared crushed and abraded, with numerous step-fractures. Above the shoulders, the point was reworked.

Spatial and Temporal Distribution. Specimen -612 was recovered from the Vaqueros paleosol and was associated with Feature 12 at CCO-696 South. Specimen -2019 was found at CCO-696 North, associated with the Kellogg paleosol. The Annadel specimen (-612) produced a hydration measurement of 0.9 micron; the Napa Valley specimen (-2019), a hydration measurement of 2.6 microns. Shouldered lanceolates were associated with components radiocarbon-dated between 9870 and 1320 cal B.P.

Concave Base

A total of 2 concave-base projectile points were collected, including 1 chert (95-8-1804) and 1 Napa Valley obsidian (95-8-1825) specimen. Both specimens were basal fragments that appeared biconvex in cross section. Complete dimensions of these points included width (16.9 and 25 mm) and thickness (7.1 and 9.1 mm). Specimen 95-8-1804 was relatively small (wt. = 2.1 g) and had a shallow (1.8 mm), asymmetrical basal notch. Specimen 95-8-1825 weighed 9.1 g and had a deep (6.7 mm) basal

notch. A patch of cortex was present on one face and reworking of the blade created well-defined shoulders. The point is illustrated in Figure IV.2.

Spatial and Temporal Distribution. Both concave-base points were recovered from the Vaqueros paleosol in CCO-696 South. A hydration value of 4.3 microns was recorded from the Napa Valley obsidian specimen (95-8-1825). Concave-base points were associated with a component radiocarbon-dated between 2765 and 1320 cal B.P.

Large Side Notched

A total of 7 side-notched points were collected, including 3 chert and 4 obsidian specimens. Side-notched points made up 43.8% of the total Large-projectile-point collection. The assemblage included 2 complete, 1 conditionally complete, and 4 basal fragments. In outline, complete points were leaf shaped with incipient to well-defined notches and convex blades. Specimens with complete measurements averaged 43.4 mm long (s.d. = 4.9), 19.0 mm wide (s.d. = 2.6), and 8.5 mm thick (s.d. = 1.8). PSAs ranged between 105 and 210 degrees.

Spatial and Temporal Distribution. Four side-notched points were recovered from the Vaqueros paleosol in CCO-696 South and 3 were collected from soil Unit I at CCO-637. Two specimens (95-7-400, -401) were associated with Burial 7 and 1 (95-7-402) was associated with Burial 5 at CCO-637. Obsidian-hydration values from 3 Napa Valley obsidian points averaged 3.8 microns with a range of 3.0 to 4.5 microns. A hydration value of 1.3 microns was recorded from the Annadel obsidian specimen (95-8-1742). (Specimens -400, -401, and -402 are illustrated in Figure IV.2.) Side-notched points were recovered from components radiocarbon-dated between 2765 and 1320 cal B.P.

Wide Stem

A single complete Napa Valley obsidian, wide-stem point was collected. The specimen was biconvex in cross section, with a square stem (PSA = 90 degrees) and a convex blade. The base appeared abraded along the margins and retained the striking platform of the original flake. The specimen was large, weighing 26.2 g and measuring 63.6 mm long, 34.1 mm wide, and 13.9 mm thick. It is illustrated in Figure IV.2.

Spatial and Temporal Distribution. The wide-stem point was recovered from the Kellogg paleosol in CCO-696 South. The Napa Valley obsidian specimen produced a mean hydration band of 6.9 microns. This point was recovered from a component radiocarbon-dated between 9870 and 7440 cal B.P.

BIFACES

A total of 176 bifaces were recovered, including 151 obsidian (85.8%) specimens, 18 chert (10.2%), 5 slate, 1 quartz, and 1 of unknown material. The majority of the items in the biface collection were fragments, with only 1 complete and 1 conditionally complete biface; fragments included 36 ends (20.5%), 43 margins (24.4%), 47 midsections (26.7%), and 48 tips (27.3%). A total of 147 (83.5%) specimens were probably remnants of projectile points and/or knives, while 29 specimens (16.5%) have been defined as biface blanks or roughouts. Due to the fragmented and diverse nature of the items in the collection, no summary metric table is provided. Metric and provenience information on all individual biface specimens is given in Appendix C. Selected bifaces are illustrated in Figure IV.1.

Obsidian Bifaces

A total of 151 obsidian bifaces were collected, including 120 Napa Valley (79.4%), 23 Bodie Hills (15.2%), 5 Annadel (3.3%), and 3 Borax Lake (2.0%) specimens. The majority of the obsidian bifaces (127, 84.1%) were considered possible projectile-point and/or knife fragments based on degree of flaking (three or more flake scars per centimeter) and general symmetry of form. Included as projectile-point and/or knife fragments were 4 Annadel (3.1%), 2 Borax Lake (1.6%), 22 Bodie Hills (17.3%), and 99 Napa Valley (78.0%) specimens. Bifaces with equal to or fewer than three arrises per centimeter included 20 ends, 33 margins, 31 midsections, and 42 tips. One large (length = 52.5 mm) Bodie Hills obsidian midsection was unique: the specimen (95-8-1812) was completely worked in a parallel, "ribbon-flaked" fashion. The biface, which yielded a 3.4-micron hydration reading, is illustrated in Figure IV.1

All flake scars terminated at or crossed the midline of the artifact; a small portion of one margin appeared reworked. One notched specimen (95-8-878), classified as a margin, may be the basal portion of a concave-base or side-notched point.

Twenty-four bifaces (16.0%) were identified as possible blanks or roughouts based on degree of flaking (fewer than three arrises per centimeter), sinuous margins and/or asymmetry of form. These included 21 Napa Valley (87.5%) specimens and 1 each of Annadel, Borax Lake, and Bodie Hills obsidians. Bifaces with fewer than three arrises per centimeter included 1 complete specimen, 11 ends, 6 margins, and 6 midsections. The only complete biface (95-8-1838) was a large, leaf-shaped, Napa Valley obsidian specimen. The proximal two-thirds of the biface was shaped by percussion, while the distal one-third was finely pressure-flaked. It had a mean hydration band of 1.9 microns.

Spatial and Temporal Distribution

Obsidian bifaces were recovered from the Kellogg (n = 2, 1.3%) and Vaqueros (n = 51, 34.0%) paleosols in CCO-696 South; from soil Unit I at CCO-637 (n = 4, 2.7%), and from the Brentwood alluvium at CCO-458 East (n = 8, 5.3%), CCO-458 West (85, 56.0%), and CCO-636 (n = 1, 0.6%). One specimen (95-2-1480) was recovered from the exposure matrix of Burial 1 at CCO-458 West and 12 specimens were recovered from burial exposure and burial matrices at CCO-696 South. One specimen (95-7-417) from CCO-637 was associated with Burial 7, and 1 specimen (95-8-613) from CCO-696 South was associated with Feature 20. A total of 26 Napa Valley obsidian-hydration values were recorded, averaging 3.2 microns and ranging between 1.2 and 10.4 microns (s.d. = 1.83). A total of 12 Bodie Hills obsidian hydration values was recorded averaging 3.0 microns and ranging between 1.2 to 4.3 microns (s.d. = 0.96). Hydration values from 2 Annadel obsidian specimens were 1.1 and 1.2 microns (s.d. = 0.07). Obsidian bifaces were associated with components radiocarbon-dated between 9870 and 465 cal B.P.

Chert Biface Fragments

A total of 18 chert biface fragments were recovered, including 9 midsections , 4 ends, 3 tips, and 2 margins. All specimens were identified as possible projectile-point or knife fragments based on the degree of flaking (three or more arrises per centimeter) and general symmetry of form. Two specimens (95-8-759 and 95-2-38) appeared thermally fractured.

Spatial and Temporal Distribution

Chert bifaces were recovered from the Vaqueros paleosol in CCO-696 South (n = 12, 66.7%), from soil Unit I at CCO-637 (n = 2, 11.1%), and from the Brentwood alluvium in CCO-458 West (n = 4, 22.2%). One specimen (95-8-644) was collected from Feature 19 at CCO-696 South. Chert bifaces were associated with components radiocarbon-dated between 2765 and 465 cal B.P.

Slate Bifaces

A total of 5 slate bifaces were recovered, including 1 conditionally complete specimen, 2 margins, and 2 tips. These artifacts were bifacially modified along the margins, with only minor interior thinning. The one conditionally complete specimen (95-8-1429) was a large, leaf-shaped biface that measured 65.1 mm long, 29.9 mm wide, and 5.5 mm thick, and weighed 15.8 g. It is illustrated in Figure IV.1.

Spatial and Temporal Distribution

Four slate bifaces were recovered from the Vaqueros paleosol in CCO-696 South and 1 was collected from the Brentwood alluvium in CCO-458 West. Slate bifaces were found in components radiocarbon-dated between 2765 and 465 cal B.P.

Miscellaneous Bifaces

One quartz tip and 1 midsection of unknown material make up the miscellaneous biface category. The quartz specimen (95-8-1361) was symmetrical, biconvex in cross section, and appeared to be the distal portion of a projectile point. The fragment measured 30.2 mm long, 23.1 mm wide, and 10.6 mm thick. Specimen 95-2-2564 was relatively large (38.8 mm long x 31.5 mm wide x 9.4 mm thick) and

biconvex in cross section, and appeared to be the medial portion of a projectile point. Both margins of 95-2-2564 constrict at the base, indicating that the biface was originally stemmed or side notched. The flake scars on both faces of the specimen were highly abraded.

Spatial and Temporal Distribution

The quartz specimen was recovered from the Vaqueros paleosol in CCO-696 South. The other fragment was collected from channel gravels in one of the buried meanders of Kellogg Creek that underlay the Brentwood alluvium at the north end of CCO-458. The quartz specimen was recovered from a component radiocarbon-dated between 2765 and 1320 cal B.P. Specimen 95-2-2564 was collected from a landscape feature radiocarbon-dated between 5810 and 1215 cal B.P.

CORES, CORE TOOLS, AND COBBLE TOOLS

Under this category are placed freehand percussion cores, core tools, and cobble tools. Summary metric data are provided in Table IV.4. See Appendix C for metric and provenience data for individual artifacts.

Freehand Percussion Cores

A total of 115 freehand percussion cores was recovered. The category was dominated by 57 siltstone (49.6%), 29 chert (25.2%), and 17 quartzite (14.8%) specimens; also included were 5 dacite, 3 basalt, 2 granite, and 1 each petrified wood and quartz. Cores were defined as cobbles or angular spalls that had at least three flake removal scars, but bore little or no evidence of additional use (e.g., micro-edge damage, crushed margins, abrasion). These cores varied in size from small (wt. = 1.4 g) to quite large (wt. = 1,570.0 g), and ranged in length between 35.2 and 171.0 mm, in width between 27.6 and 141.8 mm, and in thickness between 18.8 and 99.7 mm. Seventy cores (60.9%) were unidirectionally flaked, while 45 (39.1%) specimens had multidirectional flake scars. One chert core (95-2-2575) was bifacially worked. Six cores were minimally modified split cobbles, including 3 quartzite, 1 dacite, 1 chert, and 1 siltstone. Thirty-nine (33.9%) cores retained portions of cobble cortex.

Spatial and Temporal Distribution

Fifteen (13.0%) cores were recovered from the Kellogg paleosol, 4 in CCO-696 North and 11 in CCO-696 South. A total of 61 (53.0%) cores were collected from the Vaqueros paleosol, 1 in CCO-696 North, 58 in CCO-696 South, and 2 from offsite locations. A total of 19 cores (16.6%) were collected from soil Unit I at CCO-637, and 20 (17.4%) cores were recovered from the Brentwood alluvium (n = 5 at CCO-458 East, n = 5 at CCO-458 West), or chronostratigraphic equivalents at CCO-459 (n = 9) and CCO-636 (n = 1). Two cores were associated with Feature 20 (95-8-611, -610), 1 with Feature 17 (-637), and 1 with Feature 14 (-628) in CCO-696 South. Cores were recovered from components radiocarbon-dated between 9870 and 465 cal B.P.

Bipolar Percussion Cores

A total of 15 bipolar cores of obsidian were recovered, including 14 Napa Valley specimens and 1 of Bodie Hills. These cores displayed sheared faces and bidirectional flake scars along the long axis, characteristics indicative of anvil-supported percussion. Bipolar cores in the collection weighed between 0.7 and 3.9 g and ranged in length between 14.0 and 29.7 mm, in width between 10.0 and 19.2 mm, and in thickness between 4.3 and 12.2 mm. Six Napa Valley obsidian cores retained patches of cobble cortex and at least 2 specimens—1 Napa Valley and 1 Bodie Hills—appeared to be reworked bifaces. Five cores had micro-damage along at least one margin, possibly indicating a subsidiary function.

TABLE IV.4
CORES, CORE TOOLS, AND COBBLE TOOLS, SUMMARY METRIC DATA

	Total	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Cobble Tool	16				
Number		16	16	16	16
Mean		81.4	70.9	51.2	620.0
s.d.		15.1	14.6	13.0	1148.2
Minimum		58.2	49.6	28.2	104.0
Maximum		117.4	100.1	76.7	4890.0
Core Tool	13				
Number		13	13	13	13
Mean		70.7	54.8	41.6	200.9
s.d.		18.1	12.8	11.8	121.8
Minimum		42.8	34.4	23.4	46.0
Maximum		96.6	74.9	58.8	390.8
Cores	115				
Number		115	115	115	115
Mean		67.6	53.6	39.2	181.6
s.d.		22.2	16.7	12.9	214.2
Minimum		35.2	27.6	18.8	1.4
Maximum		171.0	141.8	99.7	1570.0
Bipolar Cores	15				
Number		15	15	15	15
Mean		21.0	13.5	7.7	1.8
s.d.		3.7	2.6	2.1	0.8
Minimum		14.0	10.0	4.3	0.7
Maximum		29.7	19.2	12.2	3.9

Spatial and Temporal Distribution

Fourteen bipolar cores were recovered from the Brentwood alluvium in CCO-458 West. One reworked biface was collected from the Vaqueros paleosol in CCO-696 South. Bipolar cores were found in components radiocarbon-dated between 2765 and 465 cal B.P.

Core Tools

A total of 13 core tools were recovered, including 5 siltstone specimens, 3 quartzite, 2 chert, 2 dacite, and 1 petrified wood. Core tools were cobbles or massive flakes that, like cores, had sizable flakes detached, but that also displayed edge-damage—crushing and/or abrasion— indicating additional use. Core tools weighed between 46 and 390 g and ranged in length between 58.2 and 49.6 mm, in width between 49.6 and 100.1 mm, and in thickness between 28.2 and 76.7 mm. Five core tools were unidirectionally flaked, while 8 had multidirectional flake scars. All of the specimens showed use-wear along at least one margin. Seven specimens retained large portions of cobble cortex.

Spatial and Temporal Distribution

Three core tools were recovered from the Kellogg paleosol and 7 were from the Vaqueros paleosol in CCO-696 South. One core tool was collected from soil Unit I at CCO-637, and 2 were from the Brentwood alluvium in CCO-458 West. One core tool (95-8-638) was associated with Feature 17 in CCO-696 South. Core tools were found in components radiocarbon-dated between 9870 and 465 cal B.P.

Cobble Tools

A total of 16 cobble tools were collected, including 6 quartzite, 4 chert, 2 siltstone, and 1 each of dacite, gabbro, graywacke, and sandstone. Cobble tools were minimally modified, split cobbles displaying use wear, including crushed, abraded, and/or polished margins. These specimens weighed between 104.0 and 4,890.0 g, and ranged in length between 58.2 and 117.4 mm, in width between 49.6 and 100.1 mm, and in thickness between 28.2 and 76.7 mm. Five specimens had multidirectional flake scars, while the majority (n = 11, 68.8%) were unidirectionally flaked. The graywacke specimen (95-8-1728) was a cobble pestle fragment that appeared heavily crushed and abraded along the broken end.

Spatial and Temporal Distribution

Twelve cobble tools were recovered from the Vaqueros paleosol CCO-696 South and 1 was collected from soil Unit I at CCO-637. One each was recovered from the Brentwood alluvium or chronostratigraphic equivalents at CCO-458, CCO-459, and CCO-636. Cobble tools were recovered from components radiocarbon-dated between 2765 and 465 cal B.P.

MODIFIED FLAKES

Small Modified Flakes

A total of 55 small modified flakes were recovered. The overwhelming majority consist of Napa Valley obsidian specimens (n = 47, 85.5%); also included are 4 chert, 2 Bodie Hills obsidian, 1 siltstone, and 1 petrified wood. Small modified flakes weighed less than 10 g; they were minimally shaped and displayed patterned edge-modification along at least one margin. Small modified flakes ranged in length between 6.1 and 48.9 mm, in width between 5.4 and 33.7 mm, and in thickness between 2.1 and 13.8 mm. Based on trilateral cross sections, longitudinal flake scars, and/or cortical striking platforms, at least 15 (27.3%) obsidian specimens appeared to be edge-modified core spalls. Twenty-one (38.2%) obsidian specimens retained patches of cobble cortex and 2 appeared to represent bipolar percussion cores.

Spatial and Temporal Distribution. The majority (n = 48, 87.3%) of small modified flakes were recovered from the Brentwood alluvium in CCO-458 West (n = 46) or offsite (n = 2). One specimen was collected from soil Unit I at CCO-459, and 6 specimens were from the Vaqueros paleosol in CCO-696 South. One small modified flake (95-2-1896) was associated with Feature 9 in CCO-458 West ,and one (95-8-586) was associated with Feature 12 in CCO-696 South. A single modified flake (95-8-363b) of Napa Valley obsidian produced a hydration rim value of 3.0 microns. Small modified flakes were associated with components radiocarbon-dated between 2765 and 465 cal B.P.

Large Modified Flakes

A total of 13 large modified flakes were recovered, including 4 siltstone, 3 chert, and 2 quartzite specimens, as well as 1 each of basalt, dacite, hornfels, and Napa Valley obsidian. Large modified flakes weighed greater than 13.0 g. All appeared to be large core spalls that ranged in length between 38.9 and 86.7 mm, in width between 30.0 and 71.9 mm, and in thickness between 13.1 and 32.9 mm. The dorsal surfaces on the majority of the specimens showed numerous percussion flake scars along the margins, while the ventral faces showed little to no modification. The exception to this was specimen 95-2-2071, which was a large (65.4 x 64.2 x 31.2 mm) Napa Valley obsidian flake. This modified flake retained cobble cortex/patination on the entire dorsal surface and was extensively abraded along the margins. Based on its large size and minimal modification, it is possible that the specimen represents a quarry blank. Cobble cortex was present on 4 of the large modified flakes.

Spatial and Temporal Distribution. Two large modified flakes were recovered from the Kellogg paleosol, 1 from CCO-696 North and 1 from CCO-696 South. Eight specimens were recovered from the Vaqueros paleosol in the south locus of CCO-696 (n = 6) or chronostratigraphic equivalent soil Unit I at CCO-637 (n = 2). Three (23.1%) large modified flakes were recovered from the Brentwood alluvium in CCO-458 West.

MILLING EQUIPMENT

A total of 126 complete and fragmentary milling tools were recovered. These included specimens from nine sites and one off-site location. In addition, 34 bedrock mortar cups (BRMs) were recorded at three sites. The following analysis uses methods for groundstone classification developed by Mikkelsen (1985, 1989). Artifacts from the Los Vaqueros collection were divided into four basic groups (mortar, pestle, handstone, and millingslab) based on morphological attributes, including size, shape, and wear patterns. These groups were further divided into subtypes using more specific attributes, including degree of modification, type of use wear, and shape and number of worked ends or faces. Face and/or end shape was recorded using polar-coordinate graph paper as outlined in Mikkelsen (1985:143).

The milling equipment assemblage included 74 pestles (58.7%), 41 mortars (32.5%), 7 handstones (5.6%), and 4 millingslabs (3.2%). Table IV.5 shows the distribution of Los Vaqueros milling equipment by site. Metric and provenience information for each milling tool is given in Appendix C.

TABLE IV.5
MILLING TOOLS RECOVERED FROM LOS VAQUEROS SITES

					CA-CCO-					
	458	**459**	**468**	**469**	**631**	**636**	**637**	**696**	**Offsite**	**Total**
BRMs	-	18	6	10	-	-	-	-	-	34
Pestles	14	1	-	-	6	1	13	38	1	74
Mortars	2	2	2	-	1	4	3	27	-	41
Handstones	-	-	-	1	-	-	-	6	-	7
Millingslabs	-	-	-	-	-	-	-	4	-	4
Total	16	21	8	11	7	5	16	75	1	160

PESTLES

A total of 49 classifiable pestles and 25 unclassifiable pestle fragments were collected. The classifiable pestles were assigned to three primary types according to degree of shaping (shaped, slightly shaped, and unshaped). The shaped specimens were further subdivided into cylindrical and conical forms. When describing pestles, end arcs ranging between 10-50 mm were considered convex, those between 50-126 mm were considered slightly convex, and those above 126 mm were considered flat (Mikkelsen 1985:155). A third distinction, convex parabolic, was also used to differentiate pestle end forms; a pestle end was considered convex parabolic if wear patterns extended up the sides of the artifact. Unclassifiable specimens were primarily spalls and medial sections, too fragmentary to characterize the end form or degree of shaping. Table IV.6 provides a breakdown of morphological attributes recorded from all pestles. Table IV.7 provides summary metric data for all pestles. Selected pestles are illustrated in Figure IV.3.

Unshaped Pestles

A total of 20 unshaped cobble pestles (33.3%) were recovered, with the following material types represented: 11 sandstone, 6 graywacke, 2 quartzite, and 1 unknown. This type includes 17 complete specimens and 3 end portions. Ten of the complete cobble pestles had opposing working ends, while 7 were single-ended. Specimens with opposing working ends displayed a variety of end forms, while complete single-ended pestles were primarily convex. Polish was the most frequently recorded end wear, although spalling, battering, and pecking were frequently represented.

TABLE IV.6
PESTLES, MORPHOLOGICAL ATTRIBUTES

	Shaped	Sl. Shaped	Unshaped	Indet.	Total
Total Artifacts	22	7	20	25	74
Total Ends	32	11	30	9	82
Condition					
Complete	15	5	17	-	37
Medial	3	-	-	2	5
End	4	2	3	9	18
Fragment	-	-	-	14	14
	22	7	20	25	74
Form					
Cylindrical	16	-	-	-	16
Conical	6	-	-	-	6
Cobble	-	7	20	-	27
Indeterminate	-	-	-	25	25
	22	7	20	25	74
End Shape					
Convex	2	-	7	9	18
Convex Parabolic	2	1	2	-	5
Convex/Convex	1	-	3	-	4
Convex/Flat	3	-	1	-	4
Convex/Sl. Convex	4	2	2	-	8
Flat/Sl. Convex	-	2	1	-	3
Flat/Flat	1	-	-	-	1
Sl. Convex/Sl.Convex	2	-	-	-	2
Convex/Indet.	1	-	2	-	3
Sl. Convex/Indet.	1	-	-	-	1
Convex Parabolic/Flat	-	-	1	-	1
Sl. Convex	2	2	1	-	5
	19	7	20	9	55
End Wear					
Polished	11	8	12	6	37
Pecked	1	-	1	-	2
Battered	1	-	2	-	3
Spalled	2	-	3	-	5
Indeterminate	1	-	-	-	1
Polished, Pecked	3	-	2	-	5
Polished, Battered	2	2	4	-	8
Polished, Spalled	4	1	4	2	11
Battered, Spalled, Polished	1	-	-	-	1
Battered, Spalled	3	-	2	-	5
Polished, Striated	1	-	-	-	1
Pecked, Spalled	1	-	-	1	2
Polished/Indet.	1	-	-	-	1
	32	11	30	9	82
Side Wear					
None	-	-	11	-	11
Pecked	8	5	5	6	24
Pecked, Polished	14	2	2	4	22
Polished	-	-	2	1	3
	22	7	20	11	60

TABLE IV.7
PESTLES, SUMMARY METRIC DATA

	Total	Length (mm)	Width (mm)	End Arc (degrees)
Unshaped	20			
Number		17	17	28
Mean		211	80	45
s.d.		52.5	17.9	31.9
Minimum		135	55	15
Maximum		300	119	127
Sl Shaped	7			
Number		5	5	11
Mean		176	72	64
s.d.		63.0	8.0	35.5
Minimum		125	63	13
Maximum		282	84	127
Conical	6			
Number		5	5	10
Mean		257	55	53
s.d.		159.2	7.8	41.6
Minimum		125	43	13
Maximum		486	63	127
Cylindrical	16			
Number		10	10	21
Mean		209	72	61
s.d.		0.62	0.15	0.35
Minimum		143	49	20
Maximum		318	98	127

Spatial and Temporal Distribution

All in situ unshaped cobble pestles were recovered from the Vaqueros paleosol or its chronostratigraphic equivalent, soil Unit I at CCO-637. Fourteen were recovered from CCO-696, 3 from CCO-637, 2 from CCO-631, and 1 from off site. One large cobble pestle (95-8-1385) was recovered with a cylindrical pestle and a large mortar in Exposure 5 at CCO-696 (Feature 24). One pestle (95-12-44) was found off site, exposed in the Kellogg Creek bank just south of Profile 1. Unshaped cobble pestles were associated with components radiocarbon-dated between 5795 and 1320 cal B.P.

Slightly Shaped Pestles

Seven slightly shaped pestles were recovered, including 5 sandstone and 2 graywacke artifacts. This type was represented by 5 complete specimens and 2 end portions. Four specimens had opposing working ends: 2 were convex/slightly convex and 2 were flat/slightly convex. One pestle was single ended and convex parabolic. End wear was most frequently represented by polish. The sides of all specimens were modified either through intentional shaping or use: 5 specimens displayed pecking and 2 were pecked and polished.

Spatial and Temporal Distribution

All in situ slightly shaped pestles were recovered from the Vaqueros paleosol or its chronostratigraphic equivalent, soil Unit I at CCO-637. Two specimens were recovered from CCO-696

North and 2 were recovered from CCO-696 South. Three were collected at CCO-637. One slightly shaped pestle (95-7-365) was recovered from Feature 6 at CCO-637. Slightly shaped cobble pestles were associated with components dated between 5795 and 690 cal B.P.

Shaped Conical Pestles

A total of 6 conical pestles were recovered, including 4 of sandstone and 2 of graywacke; all but 1 of the items are complete. All complete specimens had opposing working ends, represented by a variety of end forms. Working ends were most frequently polished, with spalling, and battering recorded on several ends. The sides of all specimens were symmetrically shaped either intentionally or through use; 5 were pecked and polished and 1 was pecked.

Two conical pestles, associated with burials, stood out as exceptional. Specimen 95-8-9 was the longest pestle in the collection, measuring close to one-half a meter (486 mm). The artifact was perfectly symmetrical, tapering from a bottom diameter of 62.3 mm. to a top diameter of 40.5 mm. The second specimen (95-8-109) measured 358 mm long, tapering from a width of 68.5 mm to 45.8 mm. In cross section the specimen was roughly tabular with convex, shaped edges. The other 3 complete, conical pestles were relatively small, measuring between 125 and 192 mm long and between 48.7 and 59.9 mm in diameter.

Spatial and Temporal Distribution

Five conical pestles were recovered from the Vaqueros paleosol or its chronostratigraphic equivalent, soil Unit I at CCO-637. One (95-8-1758) was recovered from the surface of the Brentwood soil. The majority (n=5) of the conical pestles were recovered from CCO-696 South. One was collected at CCO-637. Two were associated (95-8-9, -109) with burials (Burial 27 and 76) and 1 (95-8-1406) was associated with a small, shaped mortar (Feature 23) at CCO-696 South. Conical pestles were associated with components radiocarbon-dated between 2765 and 690 cal B.P.

Shaped Cylindrical Pestles

A total of 16 shaped, cylindrical pestles were recovered, including 2 andesite, 1 quartzite, 1 graywacke, and 12 sandstone artifacts. This type was represented by 10 complete specimens, 3 ends, and 3 medial portions. Eight complete specimens had opposing working ends and two were single-ended. Double-ended pestles were most commonly convex and slightly convex (see Table IV.6). Single-ended specimens were slightly convex and convex parabolic. Polish was the most frequently recorded use wear. End wear was most frequently represented by polish only. The sides of all specimens were shaped, either intentionally or through use; 7 specimens were pecked and 9 were pecked and polished.

Spatial and Temporal Distribution

A total of 10 cylindrical pestles were recovered from the Vaqueros paleosol or its chronostratigraphic equivalent, soil Unit I at CCO-637. Three were recovered from the surface of the Brentwood soil. Two pestles were collected from CCO-458 West, 3 from CCO-631, 4 from CCO-637, 2 from CCO-696 North, and 4 from CCO-696 South. One pestle was collected from CCO-636. Burial 157 at CCO-696 North contained a thermally fractured, cylindrical, pestle midsection (95-8-2099). One cylindrical pestle (95-8-629) was collected from Feature 14 and 1 (95-8-1382) was collected from Feature 24 in CCO-696 South. A complete cylindrical pestle (95-7-394) was also recovered from Feature 7 at CCO-637. Cylindrical pestles were associated with components dated between 5795 and 465 cal B.P.

Pestle Fragments

A total of 25 pestle fragments were collected; the majority (21; 84%) were of sandstone, while 3 graywacke and 1 andesite specimen were also collected. Since assignment to the pestle category was primarily based on end morphology and use wear, most pestle fragments were ends and end spalls (n=16, 64.0%), 2 were medial sections, and 7 were margin fragments. Nine of the end fragments had convex working ends: 6 were polished only. Polish was identified on the sides of most specimens (n = 15, 60.0%); 6 were pecked, and 4 were pecked and polished.

Spatial and Temporal Distribution

A total of 11 pestle fragments were recovered from the Vaqueros paleosol or its chronostratigraphic equivalent, soil Unit I at CCO-637. Thirteen were recovered from the Brentwood alluvium or its chronostratigraphic equivalent at CCO-459. A total of 12 pestle fragments were collected from CCO-458, 9 from CCO-696 South, 2 from CCO-637, 1 from CCO-631, and 1 from CCO-459. Pestle fragments were recovered from components radiocarbon-dated between 5795 and 465 cal B.P.

MORTARS

A total of 34 classifiable mortars and 6 unclassifiable mortar fragments were recovered, including 36 sandstone, 1 micaceous sandstone, 1 andesite, and 2 unknown specimens. A total of 34 bedrock mortar cups (BRMs) were also recorded. The 68 classifiable mortar cups were placed into three primary types: bowl mortar, block mortar, and bedrock mortar. Bowl mortars were relatively thin-walled specimens, typically resembling vessels, that were either shaped or made from roughly spherical cobbles. Block mortars were formed in large, tabular or block-shaped sandstone cobbles. Most of the latter specimens appeared to represent "hopper" mortars, based primarily on the depth of the mortar cup. BRMs are fixtures formed in surface exposures of sandstone; where possible, BRM mortar cups were further characterized as large or small, based primarily on depth and diameter measurements. Table IV.8 provides a breakdown of morphological attributes recorded from bowl and block mortars. Table IV.9 provides summary metric data for bowl and block mortars. Bedrock metric information is provided in Table IV.10. Appendix C lists attribute data for individual, classifiable, bowl and block mortars. Selected mortars are illustrated in Figure IV.4.

Two items tentatively classified as miniature mortars did not exhibit the polished wear characteristic of mortars used in food processing. For this reason, they are described below under Miscellaneous Items.

Bowl Mortars

A total of 7 complete/conditionally complete bowl mortars and 11 fragments were recovered, including 1 andesite, 1 micaceous sandstone, 2 unknown, and 14 sandstone artifacts. Six specimens were considered to be small bowl mortars based on recorded or reconstructed cup diameters (between 97 and 132 mm) and depths (between 36 and 70 mm). Two complete/conditionally complete specimens and 10 fragments were considered to represent large bowl mortars, based on recorded or reconstructed cup diameters greater than 132 mm and depths greater than 70 mm.

Small Bowl Mortars

Two shaped and 4 cobble specimens were recovered, including 1 micaceous sandstone and 4 sandstone artifacts and 1 of unknown material. Exterior shaping was represented by pecking on one specimen and pecking and polish on the other specimen. Interior wear was primarily represented by polish (n=2); 2 specimens were pecked and polished, 1 was pecked, and 1 had indeterminate wear.

Large Bowl Mortars

A total of 3 shaped, 1 slightly shaped, 4 unshaped, and 4 indeterminate fragments were recovered, including 1 andesite and 10 sandstone specimens and 1 of unknown material. Exterior shaping was represented by pecking scars on 1 slightly shaped and 3 shaped mortars. Interior use wear was primarily represented by pecking and polish. Two shaped specimens, 1 complete (95-8-8) and 1 conditionally complete (95-8-89), were burial associations. These large, symmetrical, finely finished mortars were nearly identical in shape, each having cups measuring 300 mm in diameter x 190 mm deep. They are shown in Figure IV.4.

TABLE IV.8
MORTARS, MORPHOLOGICAL ATTRIBUTES

	Shaped	Sl. Shaped	Unshaped	Indet.	Total
Total Artifacts	5	2	26	8	41
Condition					
Complete	1	-	13	-	14
Cond. Comp.	3	1	5	-	9
Fragment	1	1	8	8	18
Total	5	2	26	8	41
Form					
Block	-	1	18	-	19
Bowl	5	1	6	5	17
Indeterminate	-	-	2	3	5
Total	5	2	26	8	41
Interior Wear					
Polished	1	-	16	3	20
Pecked	1	1	2	-	4
Pecked, Polished	3	1	7	5	16
Indeterminate	-	-	1	-	1
Total	5	2	26	8	41
Exterior Wear					
Pecked	4	1	1	2	8
Polished	-	-	-	1	1
Battered	-	1	-	-	1
Pecked, Polished	1	-	-	-	1
Indeterminate	-	-	2	5	7
Total	5	2	3	8	18
Material					
Sandstone	3	2	25	7	37
Micaceous Sandstone	-	-	1	-	1
Andesite	-	-	-	1	1
Unknown	2	-	-	-	2
Total	5	2	26	8	41

Spatial and Temporal Distribution

A total of 14 bowl mortars were recovered from the Vaqueros paleosol at CCO-637. One specimen was recovered from Unit S4/W0 at CCO-459, and 3 were identified out of context . Small bowl mortars were recovered from CCO-696 North (n=1) and South (n=5). Single large bowl mortars were recovered from CCO-631,-637,-459,-458 East, and CCO-696 North, while 7 specimens were recovered from CCO-696 South. Burial 27 and Burial 57 from CCO-696 South were each associated with a large, shaped bowl mortar (see Burial Descriptions). Feature 15, in CCO-696 South, contained a bowl mortar fragment (95-8-631). Also at CCO-696 South was a small, shaped mortar (95-8-1405) found with a conical pestle in Exposure 2 (Feature 23), and a large, unshaped mortar fragment (95-8-1377) recovered with two large, unshaped pestles in Exposure 5 (Feature 24). Bowl mortars were recovered from components radiocarbon-dated between 2765 and 690 cal B.P.

TABLE IV.9
BLOCK AND BOWL MORTARS, SUMMARY METRIC DATA

	Total Ct.	Exterior Length	Exterior Width	Cup Diam.	Cup Depth	Cup Arc
Block Mortar	19	(mm)	(mm)	(mm)	(mm)	degrees
Number		19	19	19	19	12
Mean		455	306	132	45	56
s.d.		112.7	49.5	42.7	35.0	30.2
Minimum		265	215	85	9.7	25
Maximum		670	382	260	160	127
Bowl Mortar	16					
Number		3	8	8	8	7
Mean		323	229	146	95	60
s.d.		64	87	98	67	41.9
Minimum		250	131	55	29	13
Maximum		360	360	300	190	127

Block Mortars

A total of 4 conditionally complete and 13 complete specimens and 2 fragments representing block mortars were recovered. All specimens were of sandstone. Two artifacts were defined as large block mortars based on mortar cup depths greater than 84 mm and cup diameters equal to or greater than 160 mm; 13 small block mortars were distinguished based on cup depths less than 62 mm and cup diameters less than 140 mm. (No block mortars had cup depths between 63 and 83 mm or diameters between 141 and 159 mm.) Three specimens are considered to be unique.

Large Block Mortars

Two large block mortars were recorded, including 1 conditionally complete and 1 fragmentary specimen. These mortars were made from blocks of sandstone ranging between 420 and 460 mm in length and 300 and 360 mm in width. Mortar cup depths ranged between 85 and 86 mm. Cup diameters range between 160 and 172 mm. Use-wear was represented by polish on both specimens.

Small Block Mortars

A total of 13 small block mortars were collected, including 1 conditionally complete and 12 complete specimens. These artifacts were made from roughly tabular pieces of sandstone ranging in length between 265 and 635 mm and in width between 215 and 382 mm. Mortar cups ranged in depth between 10 and 61 mm and in diameter between 85 and 135 mm. Use-wear was represented by polish on 8 specimens, polish and pecking on 4 specimens, and polish and striations on 1 specimen. Some of these artifacts probably represent hopper mortars.

Unique Block Mortars

Three unique block mortars were collected, including 1 complete and 2 conditionally complete specimens. While these artifacts resembled other block mortars in overall shape, they had distinctive mortar cups and/or use-wear. One specimen (95-7-421) had a wide (205 mm), but shallow (42 mm), pecked concavity that lacked the use-wear polish found on other mortars. The specimen may have been in the process of manufacture. Another specimen (95-8-650) may have originally been a bowl mortar that had the sides removed, leaving a shallow, oval depression bordered by irregular, broken edges. The third mortar had one large, oval, pecked cup (110 mm x 152 mm) that lacked use-wear polish. The same stone had a second, small (6 mm in diameter), circular pecked depression on the same face as the larger cup.

Spatial and Temporal Distribution

Ten block mortars were recovered from the Vaqueros paleosol or its chronostratigraphic equivalent, soil Unit I at CCO-637. Eight were recovered from the Brentwood soil or its chronostratigraphic equivalent at CCO-459. One specimen was recovered at CCO-459, 1 at CCO-637, one at CCO-458 West, 2 at CCO-468, 4 at CCO-636, 4 at CCO-696 North, and 5 at CCO-696 South. One specimen (95-8-650) was associated with Feature 14 at CCO-696 South. Block mortars were associated with components radiocarbon-dated between 2765 and 465 cal B.P.

Bedrock Mortars

A total of 34 bedrock mortar cups (BRMs) were recorded at three milling stations located on surface exposures of sandstone. All cups were measured, then classified as large or small mortars. The majority of the mortar cups (n = 22, 64.7%) were considered small, based on cup diameters ranging between 45 and 110 mm and cup depths ranging between 11 and 55 mm. The remaining 12 mortar cups were considered large, based on cup diameters ranging between 125 and 180 mm and cup depths ranging between 110 mm and 230 mm. (No mortar cups measured between 111 and 124 mm in diameter or between 56 and 124 mm in depth.) Summary metric information for BRM cups is provided by site in Table IV.10. At CCO-459, 8 small pecked depressions were associated with large a large mortar cup. These small "cupules" were not considered in total counts, as they did not appear to be mortars; rather, they may have functioned as small nutting pits or anvils.

TABLE IV.10
BEDROCK MORTARS, SUMMARY METRIC DATA

	Total n	Cup Diam.(mm)		Cup Depth (mm)	
CCO-468	6				
Number		6		6	
Mean			93		31
s.d.			15		16
Minimum			65		16
Maximum			110		55
CCO-469	10				
Number		10		10	
Mean			77		17
s.d.			18		4
Minimum			45		11
Maximum			100		23
CCO-459	18				
Number		18		18	
Mean			128		124
s.d.			35		75
Minimum			60		20
Maximum			180		230
All BRMs	34				
Number		34		34	
Mean			106		76
s.d.			36		75
Minimum			45		11
Maximum			180		230

Spatial and Temporal Distribution

Bedrock mortars were recorded at three sites: CCO-459, -468, and -469. At sites CCO-468 and -469, only small mortar cups were recorded, while at CCO-459 both small and large mortar cups were recorded. The large mortar cups at CCO-459 were found buried as deep as a meter below the surface, while the small mortar cups were found exposed at the surface. Sediment samples from two of the buried, large mortar cups were submitted for radiocarbon-dating. Soil from the deepest mortar cup (85-105 cm below surface [bs], cup #10) produced a date of 920 cal B.P., while soil from the shallowest buried, large mortar cup (50 cm bs, cup #16) dated to 500 cal B.P. Bedrock mortars were associated with components radiocarbon-dated between 1620 and 465 cal B.P.

HANDSTONES

A total of 7 handstones were collected, including 1 graywacke, 1 granite, and 5 sandstone specimens. One midsection, 2 ends, and 4 complete bifacial specimens were represented. When describing handstones, face arcs ranging between 10 and 79 mm were considered convex, those between 80 and 126 mm were considered slightly convex, and those 127 mm and above were considered flat (Mikkelsen 1985:145). Morphological attributes are summarized in Table IV.11 and summary metric information is provided in Table IV.12, and data for individual items are given in Appendix C.

One handstone was considered shaped and 6 were unshaped. The shaped specimen had 2 convex faces. Both faces were polished, faceted, and displayed striations. One end of this specimen was pecked and the other pecked and battered, creating an overall symmetrical shape. Bi-convex faces occurred on 4 unshaped handstones, while 1 had flat/convex faces and 1 had convex/indeterminate faces. A variety of use-wear was represented on the faces and ends. One end fragment appeared thermally altered.

Spatial and Temporal Distribution

Seven handstones were associated with the Kellogg paleosol or its chronostratigraphic equivalent at CCO-469. One handstone was recovered from CCO-469 and 6 were found in the Kellogg paleosol at CCO-696 South. Three specimens (95-8-1242, -1243, -1244) were found cached at CCO-696 (Feature 25); they are illustrated in Figure IV.5. Handstones were associated with components radiocarbon-dated between 9870 and 7400 cal B.P.

MILLINGSLABS

A total of 4 unshaped, unifacial sandstone millingslabs were recovered, including 2 complete and 2 fragmentary specimens. Metric and provenience information is provided in Appendix C. Selected millingslabs are illustrated in Figure IV.6.

One complete specimen (95-8-1215) measured 415 mm long x 255 mm wide and had a large (310 x 210 mm), oval depression, approximately 21 mm deep. The entire depression was pecked and polished. The second complete specimen (95-8-1430) measured 375 mm long x 343 mm wide and had an irregularly shaped depression (220 x 260 mm), approximately 43 mm deep. Although the depression was well defined, use-wear was indeterminate. Consequently, this specimen was only tentatively considered a millingslab. One fragment (95-8-1432) was also tentatively classified as a millingslab. This specimen had a well-defined depression (17 mm deep), broken approximately in the center. Due to the exfoliation of the sandstone, only slight pecking could be distinguished. The fourth millingslab was also fragmentary. This specimen (95-8-1233) had a shallow (6-mm), polished and pecked depression

Spatial and Temporal Distribution

Two millingslabs were associated with the Kellogg paleosol, 1 specimen was associated with a sandy stratum immediately capping the paleosol, and 1 tentative millingslab was associated with the Vaqueros paleosol. All 4 specimens were recovered from CCO-696. Definite millingslabs were recovered from contexts radiocarbon-dated between 9870 and 7400 cal B.P. The complete, tentative specimen dated between 2765 and 1320 cal B.P.

TABLE IV.11
HANDSTONES, MORPHOLOGICAL ATTRIBUTES

	Unshaped Bifacial	Shaped Bifacial	Total
Artifacts	6	1	7
Faces	12	2	14
Portion			
Complete	3	1	4
End	2	-	2
Midsection	1	-	1
Total	6	1	7
Shape of Faces			
Convex/Convex	4	1	5
Convex/Flat	1	-	1
Convex/Indet.	1	-	1
Total	6	1	7
Face Wear			
Polished/Polished	3	-	3
Polished, Pecked, Striated/Polished, Pecked, Striated	1	-	1
Polished, Striated, Faceted/Polished, Striated, Faceted	-	1	1
Polished, Striated, Pecked/Polished, Striated	1	-	1
Polished, Striated, Faceted/Polished, Striated	1	-	1
Total	6	1	7
End Wear			
None	3	-	3
Pecked/Pecked, Battered	-	1	1
Battered, Spalled/Battered	1	-	1
Battered/None	1	-	1
Indeterminate	1	-	1
Total	6	1	7
Thermally Altered	1	-	1
Total	1	0	1

TABLE IV.12
HANDSTONES, SUMMARY METRIC DATA

	Total n	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)	Face Arcs (degrees)
Number	7	4	6	6	4	13
Mean		100	71	48	591	60
s.d.		19.3	12.1	8.9	337.1	26.7
Minimum		78	51	38	252	31
Maximum		117	84	65	950	127

MISCELLANEOUS ITEMS

A variety of miscellaneous items made from inorganic materials were recovered from Los Vaqueros sites. Included are miscellaneous pecked and battered stone, some polished stone artifacts (including stone beads and charmstones), mineral and fossil specimens, and various baked-clay items.

MISCELLANEOUS PECKED, BATTERED STONE

Miniature Mortars

Two specimens, 1 complete (95-8-1403) and 1 fragmentary (95-8-1420), were tentatively classified as miniature mortars. Both artifacts were of sandstone and had well-defined, pecked concavities (Figure IV.7). They were distinguished from small, pitted cobbles (described below) based on their spherical shape and deeper concavities. They were not considered to be milling equipment because they lacked the interior polish characteristic of mortars used for food processing. Specimen -1403 was a palm-sized item, roughly symmetrical in plan view, measuring 86.8 x 81.7 mm; it was 60.4 mm high, and weighed 672 g. The circular concavity was 16.2 mm deep and 49.9 mm in diameter. Specimen -1420 was an incomplete rim and basal fragment, 101.1 mm long, 49.8 mm wide, 60.4 mm thick, and weighed 292.4 g. The concavity was 16.8 mm deep and 53.9 mm in diameter.

Spatial and Temporal Distribution

Both miniature mortars were recovered from the Vaqueros paleosol in CCO-696 South. This component was radiocarbon-dated between 2765 and 1320 cal B.P.

Pitted Cobbles

This category includes large and small cobbles, basically unmodified except for polished or pecked concave depressions. The central concavities were too small to have functioned as mortars and may represent acorn anvils or other processing tools. The pitted cobbles have been divided into two categories : small, pitted cobbles (n = 6) and large, pitted cobbles (n = 2).

Small Pitted Cobbles

These artifacts were rounded cobbles with small, conical (n = 2) or irregularly shaped (n = 4) central depressions. The central concavities exhibited polish (n = 2) or indeterminate (n = 4) use-wear and ranged in depth between 1.6 and 3.3 mm. Only 2 specimens had two depressions on opposing faces; the majority had single depressions. Small pitted cobbles weighed between 162.3 and 432.1 g and ranged in length between 64.9 and 103.0 mm, in width between 59.7 and 103.1 mm, and in thickness between 26.7 and 52.0 mm.

Large Pitted Cobbles

Both specimens were rounded tabular cobbles that had pecked, irregularly shaped center-depressions on a single face. The depressions averaged 5.2 mm deep by 42.7 mm wide. Specimen 95-8-799 was complete and measured 143.8 mm long, 107.2 mm wide, and 72.0 mm thick and weighed 1288.0 g. Specimen 95-8-1413, which was broken approximately in half, measured 162.1 mm long, 105.4 mm wide, 55.6 mm thick and weighed 1288.0 g.

Spatial and Temporal Distribution

All of the pitted cobbles were recovered from the Vaqueros paleosol in CCO-696 South. This component was radiocarbon-dated between 2765 and 1320 cal B.P.

Battered Cobbles

The collection included 31 battered cobbles representing a variety of stone materials, including 8 chert (25.8%), 6 quartzite (19.4%), 5 siltstone (16.1%), 4 dacite (12.9%), 3 quartz (9.7%) specimens, and 1 item each of andesite, basalt, gabbro, granite, and schist. These artifacts were rounded cobbles with slight to heavily battered ends, sides, and/or faces. Battered cobbles weighed between 157.1 g and 1,290.0 g and ranged in length between 51.5 and 128.2 mm, in width between 48.7 and 107.4 mm, and in thickness between 33.2 and 74.8 mm.

Spatial and Temporal Distribution

The majority (83.9%) of battered cobbles were recovered from the Vaqueros paleosol, or its chronostratigraphic equivalent at CCO-637, as follows: 20 (64.5%) from CCO-696 South, 1 from CCO-696 North, 3 (9.7%) from CCO-637, and 1 from offsite. Three specimens were collected from the Kellogg paleosol in CCO-696 South and 2 were recovered from spoils at CCO-631. One battered cobble (95-7-204) was associated with Feature 3 at CCO-637. Battered cobbles were recovered from components radiocarbon-dated between 9870 and 690 cal B.P.

Miscellaneous Pecked/Polished Sandstone Cobbles

Included in this category are four minimally modified objects that displayed pecking or polish.

Two large, tabular, sandstone cobbles (95-8-649, -1374) had irregularly shaped, pecked areas on a single face. Both specimens were roughly rectangular in outline. A third, larger specimen (95-8-1431) was a tabular cobble, trapezoidal in outline, with rounded corners (490 x 290 x 60 mm). One face of the artifact was flat and smooth; the other face was pecked over the majority of the surface. The pecking followed the outline of the cobble, leaving a 4- to 5-cm-wide unmodified border along the edges. The pecking extended to the margin along the wide end and terminated 10 cm from the margin on the narrow end. One unique object (95-8-2077) was a small (150 x 112 x 16 mm), tabular, subrectangular, sandstone cobble. The specimen exhibited polish on three edges.

Spatial and Temporal Distribution

All specimens were collected from the Vaqueros paleosol in CCO-696 South. Artifact 95-8-649 was recovered with Feature 13. These modified cobbles were associated with components radiocarbon-dated between 2765 and 1320 cal B.P.

Pigment-Stained Sandstone

Three small sandstone fragments displayed red pigment stains. Two conjoining, tabular pieces (95-2-2506) measured 42 x 19 x 6 mm.. The third, nonconjoining, fragment (95-2-900), may be a piece of the same tablet. All items were smooth with rounded edges; pigment stains were on a single face.

Spatial and Temporal Distribution. The pigment-stained, sandstone fragments were recovered from CCO-458 West. This component was radiocarbon-dated to between 690 and 465 cal B.P.

Miscellaneous Stones

Due to the absence of naturally occurring stone in the Kellogg Creek floodplain, the presence of lithic material is considered to be a function of human transportation. This category includes 4 objects that were unmodified or only minimally modified.

Included in the collection were 2 water-rounded, dacite cobbles with polish on a single face (95-8-403, -801); 1 water-worn, tabular, glaucophane-schist cobble with battered ends (-2098); and 1 unmodified obsidian pebble (3.9 x 24.1 x 12.4 mm), visually sourced as Napa Valley obsidian (-1330).

Spatial and Temporal Distribution

The dacite cobbles were collected from the Vaqueros paleosol and the obsidian pebble was found in the Brentwood alluvium in CCO-696 South. The schist cobble was collected from the Vaqueros paleosol in CCO-696 North. These artifacts were associated with components radiocarbon- dated between 7400 to 690 cal B.P.

POLISHED STONE

Soapstone Beads

Five soapstone beads were recovered: 3 disk shaped and 2 roughly cylindrical. Specimen 95-8-680 was a complete cylindrical bead that tapered slightly from one end to the other (Figure IV.8). The wider end was ground flat, while the edges of the opposing end were rounded. A conically drilled perforation originated on the flat end. The exterior was polished and striated. Specimen 95-2-1180 was a nearly complete, biconically drilled bead that was cylindrical and had a polished exterior and flat

ends. Three disk-shaped beads were polished and biconically drilled (95-2-1782, -2243, -2611). Specimen 95-2-1782 had two saddle-shaped wear facets radiating from the central perforation, probably resulting from string-wear. One specimen (95-2-2243) was wedge-shaped in cross section and had rounded edges.

Spatial and Temporal Distribution

One soapstone bead (95-8-680) was recovered from the Vaqueros paleosol in CCO-696 South. Five beads were collected from the Brentwood alluvium in CCO-458 West. Soapstone beads were associated with components radiocarbon-dated between 1320 and 475 cal B.P.

Miscellaneous Polished Stone

This category includes several artifact forms that lack clear functional attributes. Two soapstone specimens (95-2-1024, -2055) appeared to be portions of tubes, possibly representing pipe fragments (16 x 12 x 3 mm and 17 x 11 x 3 mm, respectively). Both specimens were thin, curved, wall and rim sections, broken along three edges. They had polish and striations on both the exterior and interior surfaces. The rim edge of one specimen was rounded-over (95-2-1024); the other was flat.

Two tabular artifacts may have been pendant fragments. One slate specimen (95-2-1423) appeared to be a margin, rounded and polished along the unbroken edge (27 x 9 x 6 mm). Striations on both faces paralleled the long axis of the artifact. Specimen 95-8-1926 was a tabular, schist, end fragment (40 x 8 x 3 mm). Both faces displayed polish and striations running parallel to the long axis of the artifact; the edges and unbroken end were ground flat (see Figure IV.7).

Specimen 95-2-1631 was a soapstone, cylindrical end fragment (22 x 8 x 8 mm). The specimen was ground and polished with slight faceting, paralleling the long axis of the artifact. One end was ground and slightly convex; the opposing end was broken. Another cylindrical, schist specimen (95-8-168) was bipointed, tapering slightly from the center to each end. The complete artifact (79 x 7 x 5 mm) was polished and had slight striations running parallel to its long axis.

Spatial and Temporal Distribution

Polished stone artifacts were primarily recovered from the Brentwood alluvium in CCO-458 West. The tabular schist fragment (95-8-1926; Figure IV.7) and one cylindrical bipointed artifact were collected from the south locus of CCO-696. Specimen -1926 was associated with Burial 128, found perpendicular to the back of the cranium. Polished stone artifacts were associated with components radiocarbon-dated between 2765 and 475 cal B.P.

Charmstones

Two graywacke objects were classified as charmstones (Figure IV.7). One specimen (95-8-1398) was basically cylindrical, with the widest portion near the center, tapering towards both ends (100 x 32 x 27 mm). One end was slightly rounded, while the opposing end was battered and step-fractured. The artifact was ovoid in cross section and the surface was polished. The second object (95-8-1723) was a cylindrical cobble, pecked over much of the surface (81 x 22 x 21 mm). One end was rounded and the opposing end was battered. A pecked groove circumscribed the artifact near the rounded end.

Spatial and Temporal Distribution

Both charmstones were recovered from the Vaqueros paleosol in CCO-696 South. They were associated with components radiocarbon-dated between 2765 and 1320 cal B.P.

MINERALS AND FOSSILS

While most of the minerals and fossils collected from the Los Vaqueros investigations are unmodified, they are believed to have been collected by prehistoric inhabitants. Included were several quartz crystals and numerous iron-oxide specimens. Fossils represented animals and one plant.

Quartz Crystals

Collected during the project were 10 quartz crystals. The majority of specimens were complete single crystals. Two specimens appear to have been intentionally modified (95-2-21, 95-8-640). The first, 95-2-21 is a small fragment that may have been bifacially flaked. The second specimen (95-8-640) is a single crystal, battered on one end and ground on the edges of the facets. One unique crystal (95-8-3000) was a very large (1,064 g), double cluster. A portion of the specimen was damaged during excavation.

Spatial and Temporal Distribution

Eight quartz crystals were collected from CCO-696: 7 from the Vaqueros paleosol in the south locus and 1 (95-8-3000) from the eastern buried channel in the north locus. One specimen (95-18-5) was found at CCO-631 and one fragment (95-2-21) was recovered from the Brentwood alluvium in CCO-458 West. At CCO-696 South, a single quartz crystal was recovered from the exposure matrix of each of the following: Burial 30 (95-8-308), Burial 48 (-329) and Feature 17 (-640). Quartz crystals were associated with components radiocarbon-dated between 2765 and 690 cal B.P.

Iron Oxide

Iron oxide was represented by 27 specimens that ranged in color from bright red to yellow-orange. Most of the pieces were suitable for use as pigment and may have functioned as ochre. The majority of specimens appeared unmodified, varying in shape from rounded to angular. One modified specimen (95-2-1950) was tabular, with rounded edges, broken ends, and striations running parallel to its long axis. One unusual item (95-2-1109) was an iron-oxide concretion, shaped like a faceted crystal. Several concentric circles appeared to be deliberately etched into one side, but it was determined that they resulted from differential deterioration of the layering in the concretion.

Spatial and Temporal Distribution

Iron oxide was recovered from the Vaqueros paleosol in CCO-696 South, from chronostratigraphic equivalent soil Unit I at CCO-637, and from the Brentwood alluvium in CCO-458 West. Iron oxide was associated with Burials 1 and 14 at CCO-637. Iron oxide was collected from components radiocarbon-dated between 4770 and 475 cal B.P.

Miscellaneous Minerals

The collection includes two unique, unmodified minerals. One specimen includes three small pieces of coal (95-8-1852) collected from the Vaqueros paleosol in CCO-696 South. One small piece (13 x 10 x 8 mm) of green actinolite was recovered from the Brentwood alluvium in CCO-458 West. These minerals were associated with components radiocarbon-dated 2765 and 475 cal B.P.

Fossils

Several unmodified, Cretaceous-era fossils were recovered from archaeological deposits during the project. Fossils regularly occur in the sandstone bedrock throughout the project area and were probably intentionally collected; others may have been inadvertently transported to the sites in sandstone cobbles. Cataloged specimens—all fragments—were as follows: 5 fossilized oyster shells; 1 fossilized snail; and 1fossilized branch/root. In addition, several complete fossil oyster shells were recovered from soil Unit I during monitored excavation at CCO-637; these items were not curated.

The fossilized branch/root (95-8-163) was found in 12 conjoining pieces. The fossil was basically cylindrical, with a rough patterned exterior; in cross section, the cellular structure was visible with a hand lens.

Spatial and Temporal Distribution

The fossilized branch/root was associated with Burial 124 in CCO-696 South. Three fossilized oyster-shell fragments were recovered from the Brentwood alluvium in CCO-458 West, and two were from the Vaqueros paleosol in CCO-696 South. Fossils were recovered from components radiocarbon-dated between 4770 and 475 cal B.P.

BAKED CLAY

A total of 18,686 pieces of unassociated baked clay were collected from six sites. The collection includes unmodified lumps and fragments (80.3%), pieces with impressions (19.5%), and shaped specimens (0.1%). Descriptions of in situ baked clay can be found under Features in the Site Reports.

Unmodified Lumps and Fragments

A total of 15,014 lumps and fragments of baked clay were collected. These pieces tended to be small (0.6 g mean weight), reddened lumps, displaying no distinct impressions. Specimens were frequently blackened on one side and tended to be of a relatively coarse-grained sediment.

Spatial and Temporal Distribution

The majority (n =18,388, 98.4%) of the baked-clay lumps were collected from the Brentwood alluvium in CCO-458 West or chronological equivalents at CCO-459, -468, and -636 (n =13). The remainder was recovered from the Vaqueros paleosol CCO-696 South (n =248) or soil Unit I at CCO-637 (n =21).

Baked Clay with Impressions

A total of 3,651 pieces of baked clay with impressions was collected. Most of the specimens probably represent daub used in housing construction (see CCO-696 Features 4, 5, and 12). Identifiable impressions included grasses, branch/twigs, and fingerprints. Two basketry impressions were also cataloged. Selected specimens are illustrated in Figure IV.7.

In order to determine the frequency of different impression types, a sample composed of all the baked clay from one area exposure unit (N126/W110) at CCO-458 West was closely examined. Baked clay samples from units at other sites were too small to provide useful data. Of the 340 specimens in the sample, 123 (36.2%) were unidentifiable. These tended to be uniformly shaped, concave impressions that lacked diagnostic features or were too fragmentary to identify. The remainder fell into the following three groups:

204	grass leaf
4	branch/twig
9	fingerprint

Grass-Leaf Impressions

Unit N126/W110 had 204 specimens with grass-leaf impressions. These were small reddened lumps of coarse-grained sediment with randomly arranged impressions. Similar grass impressions from a nearby unit (N124/W105) were examined by James Bartolome from the University of California at Berkeley. Dr. Bartolome determined that all of the diagnostic impressions represented perennial bunch grasses. The only identifiable species was *Nassella pulchra* (purple needlegrass).

Branch and Twig Impressions

Four specimens had impressions that were tentatively identified as branches or twigs. These were smooth linear impressions that were much wider than the grass stems (>/= 4.4 mm). One specimen (95-2-2363a) had at least three parallel impressions on one side and a relatively smooth surface on the opposing side. The other three specimens were small, thick fragments with linear impressions.

Fingerprints

Nine specimens from unit N126/W110 displayed fingerprint impressions. Additional specimens from nearby units were identified during the original cataloging (95-2-815, -861, -1382, -1694). These were small lumps and fragments with clearly identifiable fingerprint whorls.

Basketry Impressions

Two pieces (95-2-1575 and -2337) of baked clay had impressions of twined basketry. Specimen 95-2-1575 was a thick, irregularly shaped lump, while specimen 95-2-2337 was a thin tabular fragment.

Spatial and Temporal Distribution

Most of the baked-clay items with impressions were recovered from the Brentwood alluvium in CCO-458 West (n = 3,612, 98.9%), or its chronological equivalent soil Unit I at CCO-459 (n = 1). Only 2.1% was recovered from the Vaqueros paleosol (n =22, 0.6%) or soil Unit I at CCO-637 (n =16, 0.4%). Baked clay with impressions was associated with components radiocarbon-dated between 2765 and 450 cal B.P.

Shaped Baked-Clay Fragments

A total of 21 shaped, baked-clay fragments were collected. The majority (n = 18) were indeterminate specimens made of relatively fine-grained clay that appeared to have been smoothed on one or more surfaces. The remaining 8 fragments consisted of tubes, tube fragments, and pottery fragments.

Clay Tubes

Two specimens were identified as clay tubes. Specimen 95-3-50 was a midsection fragment with smooth exterior. The tube was 17.2 mm long x 6.3 mm in diameter; it was relatively thin walled (1.1 mm). Specimen 95-2-2445 appeared to be an end fragment. The tube was 15.6 mm long and tapered in diameter from 7.7 mm to 6.4 mm. The narrower end was slightly rounded and finished; the wider end was broken. The interior perforation measured 2.7 mm in diameter.

Tube Fragments

All three specimens were curved wall fragments made from a fine-grained clay. All three had smooth exteriors. Fingerprints were visible on the exterior of one specimen (95-2-1471a). The interiors of two specimens (95-2-1471a and -1525) had impressions that appeared to be of wooden shafts, around which the clay was molded.

Pottery Fragments

Three specimens appeared to be portions of pottery. Two pieces (95-2-2491a,b) were rim fragments, broken on three sides. Both were made of a fine-grained clay and had smooth exteriors with fingerprint impressions. The third specimen (95-2-720) appeared to be the bottom of a small, conical pot. The relatively smooth exterior of the specimen tapered to a rounded base. The interior was distinguished by a well-defined bowl measuring 22.8 mm in diameter. Only small sections of the walls remained. They measured 14.5 mm in thickness. No temper was evident in any of the pottery fragments.

Spatial and Temporal Distribution

The majority of shaped clay specimens, including the pottery fragments, were recovered from the Brentwood alluvium in CCO-458 West. Two shaped clay objects, including one tube and one indeterminate fragment, were collected from soil Unit I at CCO-459. Shaped clay specimens were recovered from components radiocarbon-dated between 690 and 465 cal B.P.

SHELL BEADS

A total of 6,191 marine-shell beads were collected, including 6,074 classifiable specimens and 117 unclassifiable fragments. The collection was dominated by the genus *Olivella* (n = 5,933; 97.7%), followed by *Macoma* (n = 123; 2%), *Tresus* (n = 17; 0.3%), and a single *Haliotis* specimen. The vast majority of the shell beads were burial associations (n = 5,929; 97.6%); 150 beads (2.4%) were recovered from the surrounding matrix during burial exposure, and 112 specimens (1.8%) were unassociated midden finds. Only the unassociated finds will remain in the permanent collection.

Based on Bennyhoff and Hughes's (1987) classification, the collection included 8 bead classes composed of 11 types. An additional 3 bead types (*Macoma* Clam Disk, *Tresus* Clam Disk, *Haliotis* Disk) were collected that could not be classified according to that typology. The distribution of all cataloged shell beads by site is given in Table IV.13.

TABLE IV.13
SHELL BEADS RECOVERED FROM LOS VAQUEROS SITES, BY TYPE

Bead Type	CCO-458	CCO-637	CCO-696	Total
A1	-	97	203	300
A1a	5	181	981	1,167
A1b	9	179	226	414
A1c	2	40	2	44
A2c	-	1	-	1
B2	-	-	10	10
B2a	-	50	4	54
B2b	3	62	33	98
B2c	-	1	-	1
C	-	-	180	180
E	4	-	-	4
E1a1	3	-	-	3
E2a1	3	-	-	3
E2a4	2	-	-	2
F3a	-	-	1	1
F3b2	1	-	-	1
G	-	-	147	147
G1	-	-	718	718
G2a	-	-	2,276	2,276
G2b	-	-	1	1
G3b	-	-	1	1
L frags.	-	371	-	371
L1	-	8	-	8
L2	-	3	-	3
L3	-	119	-	119
M1a	1	-	2	3
M2a	2	-	-	2
M2b	1	-	-	1
Oliv. Frags.	-	73	44	117
Macoma	-	-	123	123
Haliotis	-	-	1	1
Clam Disk	17	-	-	17
Total	**53**	**1,185**	**4,953**	**6,191**

All beads—except for those in two large lots—were measured, recorded in a data base, and assigned to type based on metric and nonmetric data. For the lots that were not completely measured and recorded, a sample of from 20 to 65% of the total beads was arbitrarily selected and measured; then the remaining items were typed with reference to values for diagnostic attributes, but metrical data were not recorded. Measured bead attributes included length, width, diagonal, shell arc, perforation diameter, and thickness of the shell. Nonmetric observations related to bead manufacture and finish were also recorded (e.g., perforation morphology, edge preparation, shell portion, and so on). Representative specimens are illustrated in Figure IV.8.

OLIVELLA BEADS

Olivella beads were divided into 8 classes, 11 types, and 21 subtypes. Typological assignments were made to the subtype level whenever possible. Most beads with incomplete dimensions, however, could only be reliably assigned to the class level; 117 other specimens were so deteriorated that they were simply described as bead fragments. A total of 180 beads could be broadly classified but defied typing according to parameters set in the existing typology. They were assigned to the appropriate class (Class C), but no further distinction was made.

Class A: Spire-Lopped

A1. Simple Spire-Lopped (n = 1,925)

These are essentially whole-shell beads with only a small portion of the spire removed perpendicular to the long axis of the shell. Three subtypes, based on arbitrary size distinctions (small, medium, large), have been identified in the collection: 1,167 Type A1a, Small Spire-Lopped, 414 Type A1b, Medium Spire-Lopped, and 44 Type A1c, Large Spire-Lopped (Table IV.14). An additional 300 fragmentary spire-lopped beads could be identified only as Type A1. Three Type A1b beads (95-2-1073, -1818, -2610) were blackened and exfoliated, indicating that they were heat altered.

A2. Oblique Spire-Lopped (n = 1)

The specimen, defined as an A2c based on a width greater than 9.51 mm, is distinguished from Type A1 by a diagonally ground spire.

Spatial and Temporal Distribution

Class A, Spire-Lopped, beads were primarily recovered from the Vaqueros paleosol in CCO-696 South (n = 1,412, 73.5%) and Soil Unit I at CCO-637 (n = 498, 25.9%). The 16 specimens recovered from CCO-458 West were collected from the Brentwood alluvium. In the CCO-696 South, 1,385 specimens (71.9%) were associated with burials or found during burial exposure, 21 (1.1%) were unassociated midden finds, 4 were recovered from Feature 6, and 1 each from Features 12 and 17. The largest lot (n = 483, 93.9%) of Spire-Lopped beads from CCO-637 was associated with a single burial (Burial 14); 15 specimens (0.8%) were recovered during unit excavation. Spire-Lopped beads recovered from CCO-458 West were all unassociated midden finds.

Two burial lots were found in patterned arrangements: those beads associated with Burial 14 at CCO-637 and those associated with Burial 90 at CCO-696. The beads were aligned end-to-end, organized in three or four parallel rows. Both bead lots were found in the pelvic regions of the burials and appeared to represent belts or decoration sewn to garments. Spire-Lopped beads were the only bead type collected from 22 burials. They were found mixed with Class G, Saucer beads, in 25 burial lots; with Class C, Split beads, in 9 burial lots; with *Macoma* disk beads in 4 burial lots; with Class B, End-Ground beads, in 1 burial lot; and with Class L, Thick Rectangle beads, in one burial lot.

Spire-Lopped beads were associated with components radiocarbon-dated between 4770 and 1610 cal B.P. and between 690 and 465 cal B.P. Spire-Lopped beads were directly associated with a radiocarbon date of 4770 cal B.P. from Burial 14 at CCO-637, and indirectly associated with radiocarbon dates of 2355 cal B.P. from Feature 6, 2345 cal B.P. from Burial 30, and 1610 cal. B.P. from Burial 48 at CCO-696 South.

TABLE IV.14
***OLIVELLA* SPIRE-LOPPED BEADS, SUMMARY METRIC DATA**

	Total	Length (mm)	Width (mm)	Thick (mm)	Diagonal (mm)	Arc (mm)	Perf. Diam. (mm)
A1a. Small Spire-Lopped	1,167						
Number		1,092	1,020	1,148	-	-	1,104
Mean		8.8	5.6	0.7	-	-	2.2
s.d.		1.0	0.6	0.2	-	-	0.5
Minimum		5.1	3.2	0.1	-	-	1.0
Maximum		11.2	6.5	2.8	-	-	3.9
A1b. Medium Spire-Lopped	414						
Number		377	357	409	-	-	396
Mean		11.6	7.5	0.8	-	-	2.7
s.d.		1.8	0.9	0.2	-	-	0.6
Minimum		7.5	6.5	0.3	-	-	1.1
Maximum		15.4	9.5	1.5	-	-	4.3
A1c. Large Spire-Lopped	44						
Number		41	41	44	-	-	44
Mean		14.9	9.8	0.8	-	-	3.2
s.d.		0.4	0.3	0.2	-	-	0.4
Minimum		2.4	9.5	0.4	-	-	2.4
Maximum		4.3	10.7	1.1	-	-	4.3

Class B: End-Ground

B2. End-Ground (n = 159)

Type B2 are whole-shell beads with both the spire and canal ground perpendicular to the long axis of the shell. Three metric size divisions follow those defined for Type A1. All three subtypes were identified in the Los Vaqueros collection, including 54 B2a, 98 B2b and 1 B2c (Table IV.15). An additional 10 fragmentary specimens could only be identified as Type B2. Four beads were tentatively included as Type B2, 3 as B2a and 1 as B2b. Although these beads had all the characteristics of the general type, each had diagonally ground spires—a variation not accounted for in the existing typology (Bennyhoff and Hughes 1987:121).

Spatial and Temporal Distribution

The majority of End-Ground beads were recovered from two burials: one in the Vaqueros paleosol at CCO-696 North (Burial 157) and one from Soil Unit I at CCO-637 (Burial 14). A total of 47 Type B2 beads (29.6%) were associated with cremation Burial 157. Consistent with the mode of interment, the Burial 157 beads were blackened and several (21.3%) were heavily deteriorated, indicating exposure to heat. A total of 113 End-Ground beads (71.1%) were found in a mixed lot with Class A and Class L beads, associated with Burial 14 at CCO-637. Three unassociated beads (1.9%) were recovered from the Brentwood alluvium in CCO-458 West.

End-Ground beads were associated with components radiocarbon-dated between 4770 and 2585 cal B.P. and 690 and 465 cal B.P. End-Ground beads were directly associated with radiocarbon dates of 4770 cal B.P. from Burial 14 at CCO-637 and 690 cal B.P. from Burial 157 at CCO-696 North.

TABLE IV.15
OLIVELLA END-GROUND BEADS, SUMMARY METRIC DATA

	Total	Length (mm)	Width (mm)	Thick (mm)	Diagonal (mm)	Arc (mm)	Perf. Diam. (mm)
B2a. Small End-Ground	54						
Number		47	51	51	-	-	51
Mean		7.9	6.1	0.6	-	-	2.7
s.d.		0.7	0.4	0.2	-	-	0.4
Minimum		6.7	4.9	0.3	-	-	2.0
Maximum		9.6	6.5	1.1	-	-	3.6
B2b. Medium End-Ground	98						
Number		93	89	97	-	-	96
Mean		8.9	7.0	0.7	-	-	3.0
s.d.		1.2	0.5	0.2	-	-	0.4
Minimum		7.2	6.6	0.4	-	-	1.8
Maximum		14.9	9.3	1.2	-	-	3.9

Class C: Split

Split (n = 180)

Split beads from the Los Vaqueros collection could not be classified with reference to the Bennyhoff and Hughes (1987:122) typology. These are half-shell beads, split longitudinally. The ventral edges are finely ground, creating a symmetrically oval bead. These specimens frequently retain a full shelf (n = 164, 91.1%); 8 beads (5%) retained the shelf edge, and 8 had no shelf. A portion of the canal was present on all complete specimens. In contrast to any of the Class C types currently defined, the Los Vaqueros Split beads were ground dorsally at the center of the bead, creating an irregular perforation. Centrally ground perforations, in contrast to drilled perforations, distinguish these beads from Type C1. Summary metric data for Split beads is provided in Table IV.16.

Spatial and Temporal Distribution

Split beads were only recovered from the Vaqueros paleosol in CCO-696 South. A total of 145 specimens (80.6%) were direct burial associations, and 35 (24.1%) were recovered during burial exposure. The majority of Split beads (n = 118, 65.6%) came from a single unmixed lot associated with Burial 37. Class C beads were found mixed with Saucer beads in 8 lots, with Spire-Lopped beads in 9 lots, and with *Macoma* Disk beads in 3 lots.

Split beads from Burial 37 were found in a linear pattern with the ventral surface of one bead resting on the dorsal surface of the next. The arrangement indicates that the beads were probably strung. Class C beads were associated with components radiocarbon-dated between 2765 and 1320 cal B.P.

Class E: Lipped

A total of 12 Lipped beads were collected. These are round to oval-shaped beads made from the upper callus, with portions of the inner lip and/or shelf edge present. Based on metric and morphological differences, two primary types composed of three subtypes were identified in the collection. Summary metric data are provided in Table IV.17.

TABLE IV.16
***OLIVELLA* SPLIT-GROUND BEADS, SUMMARY METRIC DATA**

	Total (mm)	Length (mm)	Width (mm)	Thick (mm)	Diagonal (mm)	Arc (mm)	Perf. Diam. (Mm)
C. Split Ground	180						
Number		167	146	178	172	156	160
Mean		11.3	7.4	0.8	10.5	2.5	2.9
s.d.		2.1	1.1	0.2	1.9	0.7	0.9
Minimum		7.7	5.3	0.4	7.1	1.2	1.4
Maximum		15.2	9.7	1.4	14.3	3.6	5.4

E1a1. Normal Round Thin Lipped (n = 3)

Type E1a1 Thin Lipped beads retain portions of the thick interior callus, have ground edges, and appear asymmetrical in cross section. The E1a1 beads are essentially round; one has a conical perforation and two are biconically drilled.

E2a1. Normal Full-Lipped (n = 3)

Full-Lipped beads are oval in outline, have asymmetrical cross sections, and retain portions of the thick interior callus. All edges of E2a1 specimens were ground, and perforations were drilled conically (n = 2) from the dorsal surface or biconically (n = 1).

E2a4. Full-Lipped - Shelved Variant (n = 2)

These beads are round in outline, have fully ground edges, and are drilled conically from the dorsal surface. E2a4 beads lack the callus found on other lipped beads, however, they retain portions of the shelf edge.

Spatial and Temporal Distribution

Class E Lipped beads were found only in the Brentwood alluvium at CCO-458 West. All beads were unassociated midden finds. Lipped beads were associated with a component radiocarbon-dated to 465 cal B.P.

TABLE IV.17
***OLIVELLA* LIPPED BEADS, SUMMARY METRIC DATA**

	Total	Length (mm)	Width (mm)	Thick (mm)	Diagonal (mm)	Arc (mm)	Perf. Diam. (mm)
E2. Thick Lipped	5						
Number		5	5	5	-	5	5
Mean		11.4	9.6	1.1	-	4.4	2.4
s.d.		1.1	1.4	0.3	-	0.9	0.4
Minimum		9.7	8.1	0.6	-	3.2	2.0
Maximum		12.4	11.2	1.4	-	5.5	2.9
E1. Thin Lipped	3						
Number		3	3	2	-	3	3
Mean		11.2	9.0	0.9	-	3.8	2.1
s.d.		1.5	1.0	0.1	-	0.6	0.2
Minimum		9.6	8.2	0.9	-	3.2	1.9
Maximum		12.3	10.2	0.9	-	4.5	2.3

Class F: Saddle

F3 Saddle (n = 2)

Two beads are classified as Saddle beads. These are shell-wall beads representing two subtypes: F3a and F3b2. The single F3a, Square Saddle, is a rectanguloid bead with rounded corners. The specimen (95-8-100) is 8.6 mm long x 7.1 mm wide x 1.0 mm thick. The bead has a curvature of 2.0 mm and a diagonal measurement of 9.5 mm. The specimen has one corner that is slightly rounder than the others, creating an asymmetrical outline; the perforation is offset to one side.

The single F3b2, Small Saddle, is oval in outline and has a small central perforation (0.9 mm) and ground edges. The specimen (95-2-2415) is wider (4.3 mm) than it is long (3.9 mm) distinguishing it as a Saddle bead. The bead curvature is 1.2 mm and the diagonal measures 4.3 mm.

Spatial and Temporal Distribution

The F3a, Square Saddle, was recovered from the Vaqueros paleosol, associated with Burial 65, at CCO-696 South. The specimen was attached, with asphaltum, to a *Haliotis* ornament (Type CA4?). The bead was situated, ventral side down, over the two central perforations on the ventral surface of the ornament. The F3b2, Small Saddle, was an unassociated midden find collected from the Brentwood alluvium at CCO-458 West. Saddle beads were associated with components radiocarbon-dated between 1610 and 690 cal B.P.

Class G: Saucer

The collection included 3,143 Saucer beads. These were finely finished, circular wall beads that are classified according to metrical differences in size and perforation diameter. Three types were identified in the assemblage: G1 Tiny Saucer, G2 Normal Saucer, and G3 Ring. A total of 147 specimens (4.7%) were so deteriorated that they could only be classified into a general Class G category. Summary metric data are provided in Table IV.18.

G1. Tiny Saucer (n = 718)

Tiny Saucers are uniformly round and nearly flat in cross section, made from the shell wall. They are the smallest bead type in the collection, with a mean diameter of 4.5 mm. Central perforations are either drilled conically (n = 375, 52.2%) or biconically (n = 343, 47.8%).

G2a. Small Normal Saucer (n = 2,276)

Only a small sample (n = 438, 19.2 %) of this large lot of G2a Normal Saucers was measured. These were uniformly round wall beads that have a mean diameter of 5.7 mm. Central perforations are either biconical (n = 162, 37.0%) or conical (n = 203, 46.3%); the perforation morphology on 16.7% (n = 73) could not be determined.

G2b. Large Normal Saucer (n = 1)

One specimen was defined as a Large Normal Saucer based on an overall diameter of 8.7 mm. The specimen had a shell curvature of 1.8 mm and a perforation diameter of 2.6 mm.

G3b. Large Ring (n = 1)

One specimen was defined as a Large Ring based on an overall diameter of 8.2 mm and a perforation diameter of 2.9 mm. The shell curvature was 1.3 mm.

Spatial and Temporal Distribution

Class G Saucers were recovered only from the Vaqueros paleosol at CCO-696 South. A total of 3,130 beads were found associated with burials (97.9%) or were recovered during burial exposure (1.6%). Class G Saucers occurred in 32 burial lots; they were found mixed with Spire-Lopped beads in 26 lots, with Split beads in 8 lots, and with *Macoma* Disk beads in 4 lots. Saucers occurred solely in 5 burial lots.

Normal Saucers associated with Burial 83 and Burial 148 were found in serpentine arrangements, organized with the ventral side of one bead resting on the dorsal surface of the next. This pattern indicates that the beads were probably strung. Saucer beads from two burial lots (Burial 30 and Burial 48) were indirectly associated with radiocarbon dates of 2345 and 1610 cal B.P., respectively.

TABLE IV.18
OLIVELLA SAUCER BEADS, SUMMARY METRIC DATA

	Total	Length (mm)	Width (mm)	Thick (mm)	Diagonal	Arc (degrees)	Perf. Diam.
G2a. Normal Saucer	2276						
Number		435	431	438	-	436	440
Mean		5.7	5.5	0.9	-	1.5	1.7
s.d.		0.4	0.4	0.2	-	0.2	0.3
Minimum		5.1	4.3	0.5	-	0.9	1.1
Maximum		7.0	6.7	1.7	-	2.8	2.9
G1. Tiny Saucer	718						
Number		453	440	465	-	441	458
Mean		4.5	4.4	0.7	-	1.2	1.5
sd		0.4	0.4	0.1	-	0.2	0.2
Min.		3.4	3.2	0.4	-	0.6	1.0
Max.		5.0	5.4	1.3	-	2.3	2.6

Class L: Thick Rectangle

A total of 130 complete Thick Rectangle beads and 371 fragments were collected. The majority of these beads were deteriorated and encrusted with calcium carbonate, preventing accurate measurement and description of manufacturing characteristics (i.e., perforation morphology and edge and surface grinding). In addition to the poor condition of the beads, morphological variation precluded clear characterization of types within the Bennyhoff and Hughes (1987) classification. Three types were tentatively defined: L1, Large Thick Rectangle; L2, Small Thick Rectangle; and L3, Ovoid Thick Rectangle. Beads that were rectangular or ovoid-shaped, however, appeared to merely represent opposite ends of a gradational continuum, rather than clearly demarcated types. Summary metric data are provided in Table IV.19.

L1. Large Thick Rectangle (n = 8)

Large Thick Rectangles were parallel-sided wall beads, averaging 10.8 mm in length. Type L1 are distinguished from the dominant Type L3 by their parallel sides and sharper corners. At least 5 specimens (62.5%) were ground along the ventral edges. Four of the beads (50%) had perforations offset to one side, 1 retained a full shelf, and 2 had portions on the shelf edge. Five beads were drilled conically from the ventral surface and the perforation morphology on 3 specimens could not be determined.

L2. Small Thick Rectangle (n = 2)

These are parallel-sided wall beads averaging 8.7 mm long. Like the Type L1 beads, Small Rectangles were distinguished from Type L3 by their parallel sides and sharper corners. Ventral edge-grinding was present on two of the specimens and two had conically drilled perforations originating from the ventral surface. Perforation morphology for the third bead was indeterminate.

L3. Ovoid Thick Rectangle (n = 118)

Ovoid Thick Rectangles are wall beads of variable shape that range from nearly oval to rectanguloid in outline. They differed from the Bennyhoff and Hughes (1987:139) definition of Type L3, based on larger average dimensions and a tendency for both the sides and ends to be rounded. Ovoid Thick Rectangles in the Los Vaqueros collection averaged 10.4 mm long, 7.9 mm wide, and 1.0 mm thick. Close to half of the beads recorded had retained a full shelf (n = 17, 14.4%) or shelf edge (n = 48, 40.7%). A high frequency of beads had a perforation that was offset to one side (n = 47, 39.8%) or to one end (n = 7, 5.9%). Perforation morphology is variable: 45 beads (38.1%) were conically

drilled ventrally, 19 (16.1%) were conically drilled dorsally, 45 (38.1%) were biconically drilled, and the perforation morphology on 22 specimens (18.6%) was indeterminate. At least 58 specimens (49.2%) displayed ventral edge-grinding.

Spatial and Temporal Distribution

Thick Rectangles were only associated with a single burial (Burial 14) located in soil Unit I at CCO-637. Although Burial 14 was disturbed by heavy equipment, several of the Thick Rectangular beads were found in situ, above the pelvic region of the burial. These beads were arranged in overlapping rows ("shingled"), with a portion of the ventral surface of one bead resting on the dorsal surface of the next. The organization of the beads indicated that they were probably sewn on a belt or garment. The Class L Thick Rectangles from Burial 14 were directly associated with a radiocarbon date of 4770 cal B.P.

TABLE IV.19
***OLIVELLA* THICK RECTANGLE BEADS, SUMMARY METRIC DATA**

	Total	Length (mm)	Width (mm)	Thick (mm)	Diagonal (mm)	Arc (degrees)	Perf. Diam. (mm)
L1. Large Thick Rectangle	8						
Number		8	8	8	8	8	8
Mean		10.8	8.1	1.1	11.4	2.2	2.2
s.d.		0.5	0.7	0.2	1.1	0.3	0.4
Minimum		10.1	7.3	0.9	9.2	1.7	1.8
Maximum		11.3	9.6	1.3	12.6	2.5	2.8
L2. Small Thick Rectangle	3						
Number		3	3	3	3	3	3
Mean		8.7	5.8	0.9	8.6	1.7	2.1
s.d.		0.4	0.4	0.0	0.8	0.3	0.1
Minimum		8.3	5.4	0.9	8.1	1.4	2.0
Maximum		9.0	6.7	0.9	9.5	2.1	2.2
L3. Ovoid Thick Rectangle	130						
Number		106	85	118	107	96	118
Mean		10.4	7.9	1.0	10.6	2.3	2.2
s.d.		0.7	0.9	0.2	0.9	0.3	0.4
Minimum		8.1	5.4	0.4	8.1	1.6	1.1
Maximum		12.1	9.6	1.6	12.6	3.3	3.6

Class M: Thin Rectangle

Six beads were classified as Thin Rectangles. These were square to rectangular wall beads with central or end perforations. The collection included three subtypes: M1a, Normal Sequin; M2a, Normal Pendant; and M2b, Rhomboid Pendant. Summary metric data are provided in Table IV.20.

M1a. Normal Sequin (n = 3)

Normal Sequins were rectangular centrally perforated beads with squared corners and parallel ground ends and sides. One (95-2-1245) bead was roughly square; it measured 7.0 mm long x 5.9 mm wide and had a perforation diameter of 1.3 mm. The bead was blackened, reflecting exposure to heat. The other two beads were only tentatively classified as Normal Sequins. One specimen (95-8-616) was

a fragment, deteriorated along the side. It measured 8.8 mm long, had an incomplete width of 5.4 mm, and a perforation diameter of 1.7 mm. The ventral edges of the bead were ground. The third specimen (95-8-99) was slightly larger than the type definition allows. The bead measured 10.1 mm long x 7.8 mm wide and had a perforation diameter of 1.9 mm.

M2a. Normal Pendant (n = 2)

The M2a, Normal Pendants, were rectangular, end-perforated beads with squared corners and parallel ground ends and sides. Specimen 95-2-296 measured 8.8 mm long x 5.6 mm wide and had a perforation diameter of 1.0 mm. Specimen 95-2-932 measured 8.6 mm long x 5.6 mm wide and had a perforation diameter of 1.3 mm. Both specimens were blackened, probably representing exposure to heat.

M2b. Rhomboid Pendant (n = 1)

One Rhomboid Pendant was identified. The specimen (95-2-2390) was a rectangular, end-perforated bead with both ends ground diagonally. It measured 7.9 mm long x 5.1 mm wide and had a perforation diameter of 1.3 mm. Like the other pendants, the single rhomboid specimen was blackened.

Spatial and Temporal Distribution

Two tentatively defined Class M, Thin Rectangles, were recovered from the Vaqueros paleosol in CCO-696 South. One (95-8-616) was associated with Feature 20 and 1 specimen (95-8-99) was found attached with asphaltum to a *Haliotis* ornament associated with Burial 65. The other 6 Thin Rectangles were all unassociated midden finds, collected from the Brentwood alluvium in CCO-458 West. Thin Rectangles were associated with components radiocarbon-dated between 1320 and 465 cal B.P.

TABLE IV.20
***OLIVELLA* THIN RECTANGLE BEADS, SUMMARY METRIC DATA**

	Total	Length (mm)	Width (mm)	Thick (mm)	Diagonal (mm)	Arc (degrees)	Perf. Diam. (mm)
M1. Sequin	3						
Number		3	3	3	3	3	3
Mean		8.6	6.3	0.9	9.7	2.0	1.6
sd		1.6	1.3	0.2	2.4	0.7	0.3
Min.		7.0	5.4	0.7	7.9	1.5	1.3
Max.		10.1	7.8	1.1	12.4	2.8	1.9
M2. Pendant	3						
Number		3	3	3	3	3	3
Mean		8.5	5.4	1.0	9.4	1.7	1.2
sd		0.5	0.3	0.2	0.2	0.1	0.2
Min.		7.9	5.1	0.9	9.2	1.7	1.0
Max.		8.8	5.6	1.2	9.7	1.8	1.3

OTHER BEADS

Macoma Irregular Disk Beads

A total of 123 *Macoma* clam disk beads were collected. These are round beads made from the shell of the bent-nosed clam. Diagnostic attributes include wedge-shaped cross sections and irregularly ground edges. *Macoma* beads in the Los Vaqueros collection averaged 8.5 mm long x 8.1 mm wide x 1.9 mm thick, and had a mean perforation diameter of 2.0 mm. Perforations were frequently (44.4%) off-center and were either conically (n = 50, 40.7%) or biconically (n = 59, 48.0%) drilled. The

perforation morphology on 14 specimens could not be determined. Summary metric data for clam disk beads are provided in Table IV.21.

Spatial and Temporal Distribution

Macoma Disk beads were recovered only from the Vaqueros Paleosol in CCO-696 South. A total of 119 beads (96.7%) were associated with 10 burials; the majority (n = 101, 82.1%), however, were found with two interments (Burial 33 and Burial 78). *Macoma* beads were mixed with Saucer beads in four burial lots, with Spire-Lopped beads in four lots, and with Split beads in three burial lots. *Macoma* beads were solely associated with four burials. These beads were recovered from components radiocarbon-dated between 2765 and 1610 cal B.P.

TABLE IV.21
***TRESUS* AND *MACOMA* CLAM DISK BEADS, SUMMARY METRIC DATA**

	Total	Length (mm)	Width (mm)	Thick (mm)	Diagonal (mm)	Arc (degrees)	Perf. Diam. (mm)
Macoma Disk	123						
Number		113	113	112	113	-	113
Mean		8.5	8.1	1.9	8.3	-	2.0
sd		1.1	1.1	0.5	1.0	-	0.3
Min.		5.0	4.7	0.7	4.9	-	1.2
Max.		11.5	11.3	3.5	11.4	-	2.8
	Total	Length	Width	Thick	Diagonal	Arc	Perf. Diam.
A1. Clam Disk	8						
Number		8	8	8	-	-	8
Mean		6.7	6.7	2.8	-	-	2.4
sd		0.4	0.4	0.5	-	-	0.3
Min.		6.2	6.2	2.0	-	-	2.1
Max.		7.5	7.3	3.5	-	-	2.7
A2. Clam Disk	9						
Number		9	8	9	-	-	8
Mean		9.1	8.8	3.4	-	-	2.6
sd		0.8	0.5	0.8	-	-	0.3
Min.		8.3	8.1	2.2	-	-	2.3
Max.		10.9	9.7	4.6	-	-	3.0

Tresus Clam Disk Beads

A total of 17 clam-shell disk beads (CSDB) were collected and are retained in the permanent collection. All of the specimens appear to represent the genus *Tresus* based on their smooth epidermal layers (Bennyhoff 1985:2). These were round, uniformly finished beads. Two subtypes were identified based on metric differences defined by Bennyhoff (1985:2): A1, Small CSDB; and A2, Medium CSDB. Summary metric data for clam disk beads are provided in Table IV.21.

A1. Small CSDB (n = 8)

Specimens were defined as A1, Small CSDBs, based on diameters ranging between 6.2 mm and 7.5 mm. The mean measurements for these specimens are 6.7 mm in diameter and 2.8 mm thick,

with a mean perforation diameter of 2.4 mm. Six specimens (75.0%) have biconically drilled perforations, while two (25.0%) are conically drilled.

A2. Medium CSDB (n = 9)

Medium CSDBs were defined based on diameters ranging between 8.3 mm and 10.9 mm. This type averaged 9.1 mm in diameter, 3.4 mm thick, and had a mean perforation diameter of 2.6 mm. Eight (88.9%) out of 9 specimens had biconically drilled perforations.

Spatial and Temporal Distribution

Clam Shell Disk Beads were all unassociated midden finds recovered from the Brentwood alluvium in CCO-458 West. They were associated with components radiocarbon-dated between 690 and 465 cal B.P.

OLIVELLA BEAD MANUFACTURING

Olivella shell debris can indicate manufacturing of beads on site. A total of five *Olivella* shell fragments were recovered, most from the northern portion of CCO-458. One inner whorl and four wall fragments were recovered, suggesting bead manufacture on site. The wall fragments (95-2-68, -265, -1857. and -1485) are possibly bead blanks (Hartzell 1991). One piece is dark from heat- treating (95-2-68). The list below gives proveniences for these items:

95-2-68	N120/W106	30-40	poss. bead blank, body wall with suture, long., dark from heat treating
95-2-265	N124/W107	30-40	poss. bead blank, body wall, latitudinal
95-2-1948	N126/W104	20-30	debris, inner whorl fragment
95-2-1857	N126/W106	10-20	poss. bead blank, body wall, square and neither long or latitudinal
95-2-1485	N126/W110	0-10	poss. bead blank, body wall, latitudinal

HALIOTIS DISK BEAD

One Haliotis disk bead was collected. Absence of the epidermal layer of the shell made a more specific species determination impossible. The specimen was a round disk bead that measured 8.6 mm in diameter, 1.3 mm thick, and had a relatively large perforation measuring 2.9 mm in diameter.

Spatial and Temporal Distribution

The single Haliotis Disk bead was an unassociated find recovered from the Vaqueros paleosol in Exposure 1 at CCO-696 South. The bead was associated with components radiocarbon-dated between 2765 and 1320 cal B.P.

HALIOTIS ORNAMENTS

REPRESENTED ORNAMENT TYPES

Haliotis ornaments recovered from Los Vaqueros include Type A: Rim, Type B: Oblong, Type C: Circular, and Type S: Oval specimens. All but one of the ornaments were recovered from burials at CA-CCO-696; 2 fragments may also represent ornaments (see Table IV.22). Several of the *Haliotis* ornaments are illustrated in Figure IV.9.

CA-CCO-696 ORNAMENTS

There were 45 *Haliotis* ornaments recovered from CA-CCO-696, including 5 pieces of *Haliotis rufescens* (red abalone), 4 pieces of *Haliotis cracherodii* (black abalone), and 36 pieces of indistinguishable *Haliotis* species. Classification and measurement of the ornaments is based on the morphological criteria established by Bennyhoff and Hughes (1987) and refined by Taite (1995). This system uses a series of letters and numbers to classify morphological attributes of each ornament. There are four basic ornament forms in the collection: rim (n = 4), oblong (n = 23), circular (n = 16), oval (n = 1), and unidentified (n = 1).

These ornaments have five types of perforations: single central perforation (Type 2), single perforation at one end (Type 3), double central perforation (Type 4), double perforation at one end (Type 5), and single perforation at each end (Type 7). Only 3 ornaments have decorations, which include notching on the edge (Type f) and *Olivella* appliqué (Type m).

TABLE IV.22
HALIOTIS ORNAMENTS FROM LOS VAQUEROS

	uAD3	uAC3	uAB5/ AD5	uBA	uBA7	rCAfm	r/uC1C	uC2C	r/c C3C	uSA	fragment	Total
CCO-696												0
Burial 57	-	-	-	-	-	-	-	-	2	-	-	2
Burial 65	-	-	-	-	-	2	-	-		-	-	2
Burial 83	2	1	1	1	1	-	4	2	2	-	-	15 *
Burial 87	-	-	-	-	-	-	-	-	1	-	-	1
Burial 90	-	-	-	-	-	-	-	-	2	-	-	2
Burial 97	-	-	-	-	-	-	-	-	-	-	1	1
Burial 155	-	-	-	-	22	-	-	-	-	-	-	22
S9/E9	-	-	-	-	-	-	-	-	-	1	-	1
												0
CCO-637												0
Burial 9	-	-	-	-	-	-	-	-	-	-	1	1
												0
Total	**2**	**1**	**1**	**1**	**23**	**2**	**4**	**2**	**7**	**1**	**2**	**47**

*Includes fishhook-shaped ornament

Type A: Rim

Rim ornaments are curvilinear bands with roughly parallel sides. There are 4 rim ornaments in the collection, all of which are of unknown *Haliotis* species. The rim forms represented in the collection are short rim (Type AB), long rim (Type AD), and the hourglass (Type AC). The short rims are defined as less than 40 mm and the long rim as over 40 mm. The hourglass shape is narrower in the center than at the ends.

Two ornaments are the long rim form with a single perforation at one end (Type AD3, 95-8-1950b, -1950d). One ornament is in the hourglass shape with a single perforation at one end (Type AC3; 95-8-1948c). The last rim ornament is fragmented; it may be either a short rim segment or a long rim segment, and has double perforations at one end (Type AB5 or AD5; 95-8-1950c). All of these ornaments are from the same burial (Burial 83).

Type B: Oblong

Oblong ornaments are rectangular with parallel sides and rounded corners. This category has 23 ornaments of the short oblong form with a single perforation at each end (Type BA7; 95-8-180 to -196, -197a, -197b, -198, -1948a, -2055, -3051). The short oblong form is defined as having a length that is at least twice the width and less than 60 mm long. All are of unknown *Haliotis* species. Twenty-two of these ornaments are from Burial 155 and the remaining ornament is from Burial 83. Despite the degraded condition of the ornaments, the perforation -drilling method of 9 ornaments is identifiable: 4 are bifacially drilled and 5 are unifacially drilled. The average dimension of these artifacts is 26.82 x 18.0 x 1.8 mm, with an average perforation diameter of 2.5 mm.

Type C: Circular

Circular ornaments are round and slightly concave. This category includes 16 shell ornaments in 5 categories; disk (Type CA), simple ring (Type C1C), narrow ring (Type C2C), broad ring (Type C3C), and circular of unidentified form (Type C). The ring ornaments have large centrally located holes.

There are two disk ornaments that have notching along the perimeter and two centrally located perforations covered with *Olivella* appliqué attached with asphaltum (Type CA4fm; 95-8-99, -100). These artifacts are both made from *Haliotis rufescens* and are both from Burial 65. There are four simple ring ornaments with no decoration or perforations (Type C1C; 95-8-1950a, -1950f, -1951, and -1947). One artifact is made of *Haliotis rufescens* and three are of indistinguishable *Haliotis* species. All are from Burial 83. There are two narrow ring ornaments with no decoration or perforations (Type C2C; 95-8-1948b, and -1949). Both are made of indistinguishable *Haliotis* species and from Burial 83. There are seven broad ring ornaments with no decoration or perforations (Type C3C; 95-8-42, -43, -88a, -88b, -134, -140, and -141) from *Haliotis rufescens* (Burial 83), *Haliotis cracherodii* (Burials 57, 87, and 90), and indistinguishable *Haliotis* species (Burial 57). One artifact, 95-8-1950e, has the appearance of a fishhook. It is either a broken ring ornament or was intentionally shaped into a fishhook. The specimen, of indistinguishable *Haliotis* species, was from Burial 83.

Type S: Oval

Oval ornaments are elliptical in shape. This category is represented by a short oval (Type SA) specimen of unknown *Haliotis* species (95-8-1124). The artifact was recovered from the 70-80 cm level of Unit S9/E9. In addition, 2 *Haliotis* shell fragments were recovered with burials at CCO-637 and CCO-696. Due to the condition of the specimens, it could not be determined if they originally represented ornaments. One fragment (95-8-2042) was associated with Burial 97 at CCO-696 and one (95-7-419) was associated with Burial 9 at CCO-637.

MODIFIED BONE
by Krislyn K. Taite

MODIFIED-BONE TYPOLOGY

Analysis of the modified-bone collection from the Los Vaqueros investigations is centered on four issues: (1) definition of temporally diagnostic types; (2) identification of site function on the basis of frequencies of functional categories present at each site/component; (3) characterization of midden versus burial-associated assemblages; and (4) comparison of the relationship between the faunal assemblage and the modified-bone assemblage.

A brief introduction to past work in the field of modified-bone analysis is necessary in order to develop a basis for analysis. Most researchers use Gifford's (1940) monograph, *Californian Bone Artifacts*, as a template for classifying modified bone from prehistoric archaeological assemblages. While a major scholarly work, that analysis focused on the tool morphology on the one hand, and the element from which the tool was fashioned on the other. Taite (1995b) offers an alternative classification system in the analysis of the CA-SAC-43 modified-bone assemblage. That analysis focused on functional implications by examining the form–function relationships rather than the element origin. In a continuing effort to augment the use of Gifford's paper, the present analysis employs the methodology that guided the CA-SAC-43 study: focusing on the location and degree of use-wear exhibited on each item of modified bone. This method hinges on the assumption that the examination of these factors will allow for functional inferences. Although species/element identifications are made, that was not the primary directive.

While Gifford used an alphabetical classification system with numeric subdivisions, succinct descriptions are here used for classification. Because so many researchers use Gifford's classification scheme, a concordance is offered to show the correlation between his classification and the new one. Table IV.23 (based on morphological types from Taite 1995b:189, Table 10.3) shows this relationship for the Los Vaqueros assemblages.

TABLE IV.23
CONCORDANCE OF MODIFIED-BONE TYPES

New Type	Gifford Type
single-pointed, sharp-tipped	A
single-pointed, blunt-tipped	A and B
single-pointed, crude splinter	A1e
serrated	H1
curved-to-flat	M or F
bipointed pin	T
bead	EE
tube, long	EE
tube, single-holed	FF
antler, distal end	HH

Bone-Tool Types at Los Vaqueros

The first category in Table IV.23 consists of three morphological variants of the single-tipped implements, formerly referred to as Gifford's "Type A: Awl" (1940:168), which functioned as a perforating implement. The morphology of the distal end constitutes the variant characteristic. The "sharp-tipped" variant is highly worked, polished, and finely shaped. These items were used as awls most commonly in basketmaking processes. The "single-pointed, blunt-tipped" implements are rounded at the distal end, while the body of the "single-pointed, crude splinter" is not well-shaped. These functioned as animal- processing tools. Most of these implements in the Los Vaqueros collection are medium-large mammal long-bone fragments; also present are one medium-large mammal tibia, one artiodactyl metapodial, and one deer metatarsal.

"Serrated" tools in the collection were made from large mammal long bone, or artiodactyl (3), deer (2), and elk (1) scapulae. Deep notches with polish on the high-points are characteristic along the length of these items. The serrations permitted a sawlike action in order to cut through some moderately soft material, such as animal flesh or skin. The "curved-to-flat" implements are highly polished thin items made from split medium-large mammal long bone or elk metapodial. "Bipointed pins" are thin, with cross-striations and some use-wear evident at the tip of the implement. They are made from medium-large mammal long bone. They are considered part of the fishing-equipment assemblage. "Beads" are made from the long bone of medium and small mammals, with minimal scoring visible at one end. The "tube, long" is scored and snapped at the end, just below the epiphysis of a variety of animals: the long bone from medium-large, medium, and small mammals; a bird ulna; and a coyote mandible. "Tube, single-holed" are otherwise referred to as whistles. The one in the Los Vaqueros collection is made from a bird ulna. "Antler, distal end" items exhibit modification at the tip of the antler in the form of scratches, gouges, and dents. While this damage may occur during the life of the animal, the morphology of the items and the location and degree of modification contribute to the designation as an artifact. See Appendix C for the catalog of modified-bone specimens.

Functional Classes

The combination of use-wear patterns, overall tool morphology, and ethnographic accounts led to functional inferences for each morphological type. Items with similar morphologies were grouped together, following groupings established in Taite (1995b:212, Table 10.7). Five functional classifications were identified in the Los Vaqueros assemblages:

Animal Processing (AR): single-pointed, blunt-tipped; single-pointed, crude splinter; serrated
Animal Procurement (AP): bi-pointed pin
Lithic Processing (LP): antler, distal end
Fiber Processing (FP): single-pointed, sharp-tipped
Ornamental–Ritual (ORN): bead; tube, long; tube, single-holed
Personal–Ceremonial (PC): curved-to-flat

Despite the variety of sites/components in the project area and their potentially different functions, the regional pattern suggests that items with use-wear and morphology indicative of fiber processing, animal processing, animal procurement, lithic processing, and of personal–ceremonial and ornamental–ritual purposes all occur in each component.

MATERIALS AND METHODS

The Los Vaqueros modified-bone assemblages were recovered from excavation units, burials, and features from six archaeological sites. Because the size and complexity of the sites within the project area varied, their modified-bone assemblages were treated differently: the largest, from CCO-458/H, was sampled, while the smaller assemblages were analyzed in total.

The two largest sites, CCO-458 and -696, were further subdivided into temporal components. CCO-458 was composed of two components: East and West. CCO-696 was divided into East, West, and Deep components. As noted above, all of the modified bone from CCO-696 was analyzed, as was the case with the remaining three sites: CCO-459; -636; and -637. (Modified bone was not recovered from CCO-468).

All of the excavation units were field-screened using 1/4" mesh, and the burial matrices were screened with 1/8" mesh. The majority of modified bone was recovered from excavation units. In general, the analysis included all modified bone recovered from the project area. When comparing the faunal assemblage to the modified-bone assemblage, only the data from excavation units were used in order to maintain a consistent sample.

Vertebrate taxa identifications were made using the zooarchaeological collections housed at California State University, Chico; Sonoma State University; and the California Academy of Science, San Francisco. Each specimen of modified bone was identified to the most specific taxonomic level possible, such that "identifiable" refers to order and more specific categories; "unidentifiable" refers to the class of animal, with divisions of mammal based on size (e.g., small mammal, large mammal). To the extent possible, each specimen was identified as to anatomical part, condition, size, side, age/fusion, and percentage of completeness. Other cultural or natural modifications noted included the presence of surface weathering, rodent gnawing, carnivore chewing, and degree of burning.

Once these faunal identifications were made, these data were analyzed following the guidelines presented in Taite (1995b). Each modified item underwent closer examination regarding indications of use-wear. The location and degree of use-wear/modification were noted, and observations were made regarding the condition of the item (i.e., proximal fragment, near complete, etc.). Use-wear, morphological classification, and analogy were used to determine function. In order to determine site function, morphological types were grouped into functional categories, and frequencies were calculated on the basis of sites/components.

THE COLLECTION

In total, there were 238 items in the analyzed sample of modified bone from the project area. Modified bone was not abundant, and some components were especially poorly represented: CA-CCO-462/468 lacked modified bone, while CCO-696 Deep and CCO-636 contained 1 item each, and CCO-458 East had just 2 specimens.

While some degree of modification or use-wear was present on every specimen, 61% of the items were considered unclassifiable to morphological/functional groups due to the fragmentary condition of the artifacts. The remaining 39% (n = 93) was composed of a variety of tool types, including "single-pointed, blunt-tipped"; "single-pointed, crude splinter"; "serrated"; "antler, distal end"; "single-pointed, sharp-tipped"; "bead"; "bi-pointed pin"; "tube, long"; "tube, single-holed"; and "curved-to-flat" items. Dealing strictly with the classifiable material, "single-pointed, sharp-tipped" tools and "curved-to-flat" implements were the most common types, each accounting for 25% of the sample. Table IV.24a shows the frequencies of morphological types.

Because there are 10 different types in this small collection, the frequency of each type is low. When the types were grouped according to functional classifications, however, then the data are more reliable. Using the higher-order classification, there was a three-way tie between Animal Processing, Fiber Processing, and Personal–Ceremonial, each with 21.5% (Table IV.25b).

TABLE IV.24a
MODIFIED-BONE MORPHOLOGICAL TYPES BY TIME PERIOD

	Upper Archaic		Emergent Period				
	696 West	**%**	**696 East**	**458 West**	**459**	**Total**	**%**
Antler, Distal End Long	4	40	0	4	1	5	10
Bead	1	10	0	2	0	2	4
Bi-Pointed Pin	1	10	0	5	1	6	12
Curved-to-Flat	1	10	1	12	0	13	25
Serrated	0	0	0	0	0	0	0
Single-Pointed, Blunt	0	0	1	6	0	7	14
Single-Pointed, Crude	0	0	0	0	0	0	0
Single-Pointed, Sharp	3	30	0	12	1	13	25
Tube	0	0	0	5	0	5	10
Tube, Single-Holed	0	0	0	0	0	0	0
Total	10	100	2	46	3	51	100

Also present were 1 Curved-to-Flat and 1 Serrated from Lower/Middle Archaic components at CCO-637 and -696 Deep, respectively.

TABLE IV.24b
MODIFIED-BONE FUNCTIONAL TYPES BY TIME PERIOD

	Upper Archaic		Emergent Period				
	696 West	**%**	**696 East**	**458 West**	**459**	**Total**	**%**
AR	0	0	1	6	0	7	14
AP	1	10	0	5	1	6	12
FP	3	30	0	12	1	13	25
LP	4	40	0	4	1	5	10
ORN	1	10	0	7	0	7	14
PC	1	10	1	12	0	13	25
Total	10	100	2	46	3	51	100

Also present were 1 AR each for Lower/Middle Archaic components at CCO-637 and -696 Deep.

DISCUSSION

The discussion below begins by grouping temporal types based on dated components. With only 1 item each for the Lower and Middle Archaic periods and only 10 items for the Upper Archaic, this aspect of the analysis is essentially academic. Returning to functional concerns, the relationship between classifications of modified bone and site/component function is examined. Comparison is also made between midden finds versus burial associations. The last area examined is the relationship between the faunal assemblage and the modified bone.

While these comparisons were designed to identify patterns, the analysis was hampered by the small numbers of modified bone recovered from any one site/component, which precluded fully reliable correlations. Nevertheless, comparisons and inferences are made in an effort to identify patterns that might be more fully investigated as more data become available for the region.

Chronology

The collection of modified bone identifiable to functional classifications was small (n = 93), with the majority of the specimens (n = 46) from component CA-CCO-458 West. Thus comparisons between components are only tentative.

Because the emphasis here is on the identification of change over time, and because not all of the contexts that yielded modified bone could be dated, those areas that lack dates have been omitted from the chronological discussion. After omitting CCO-458 Feature 1 and CCO-696 single-provenienced material, the total number of modified-bone specimens analyzed was reduced to 63 items.

The sampled material was divided into three groups based on divisions for the Lower-Middle Archaic (earlier than ca. 2500 B.P.), Upper Archaic (ca. 2500 to ca. 1000 B.P.), and Emergent periods (after ca. 1000 B.P.). Table IV.24a shows the relationship between frequency of morphological type and chronology. The Lower Archaic is represented by CCO-696 Deep and CCO-637. These two components covered a combined time span from about 8000 to 2500 B.P. Only 2 modified-bone implements represented this span—a "serrated long bone" and a "curved-to-flat" item—both of which were utilitarian items that probably functioned as animal-processing tools. The oldest component, CCO-696 Deep, contained 1 modified-bone specimen, a serrated tool made from the long bone of a large mammal. Serration of a long-bone fragment is an anomalous use; usually cervid scapulae or medium/large mammal ribs were modified in this manner. This specimen was the only item in the whole collection made from large mammal bone.

The Upper Archaic was represented by CCO-696 West, with 10 items. "Antler, distal end" and "single-pointed, sharp-tipped" implements combined comprised 70% of the morphological types, in addition to "bead," "bi-pointed pin," and "curved-to-flat" items. Functional types were primarily Lithic Processing and Fiber Processing implements.

The Emergent-period components include CCO-696 East, CCO-458 West, and CCO-459, which spanned a cumulative time range from about 1500 to 400 B.P. This group yielded 51 items, representing all other morphological types except "serrated" and "tube, single-hole." The "single-pointed, sharp-tipped" and the "curved-to-flat" implements were the most common. Most of the specimens fell into the functional classifications of Fiber Processing and Personal–Ceremonial.

Animal Processing is represented by the single item from each of the two earlier components. Later, a more generalized functional scheme included Lithic Processing and Fiber Processing implements. In the last period, Fiber Processing maintained importance, but was shared with the nonutilitarian group of Personal–Ceremonial specimens. The presence of nonutilitarian items suggests the growing importance of ceremony and ritual in the daily life of the occupants of the area.

Site Function

Table IV.24b shows the distribution of functional types per time period. Variation in frequency of functional types indicates that there were important differences in site function. For instance, sites CCO-696 West, CCO-458 West, and CCO-459 were represented primarily by Fiber Processing tools.

Animal processing appears to have been the dominant function at components CCO-696 Deep, CCO-458 East, and CCO-696 East. CCO-696 West was the only component with a predominance of Lithic Processing tools, while the two items from CCO-696 East represent Animal Processing and Personal–Ceremonial functions (Table IV.24b).

The Animal Procurement functional group includes bone points (hafted to shafts), a variety of fish "spears," with or without barbs, as well as net measures. Given that these implements were used to capture small-bodied game, their presence suggests economic importance of small animals. Based on the frequencies of economically significant mammals (lagomorphs, rodents, carnivores, and artiodactyls, as discussed in the faunal section), rodents dominate the faunal assemblages of CCO-696 Deep, CCO-458 West and East, and CCO-459. Examining the frequency of burnt to unburnt rodent bone, all but CCO-458 East contained economically significant rodents. CCO-696 Deep lacked Animal Procurement implements, but the two remaining components had them (bi-pointed pins).

Clearly, the data suggest that there was variation in the activities among the components. Taken in conjunction with other lines of research and analysis (i.e., amount of debitage, projectile points, etc.), patterns of site function will be more evident.

Burial Associated versus Nonburial Associated

A total of 14 modified-bone items were associated with burials; 10 were classifiable as to functional category. Such a small sample makes inferences only speculative. Table IV.25 shows the relationship between the morphological types present overall, versus those present only with burials. The latter group includes "antler, distal end"; "bi-pointed pin"; "curved to flat"; "serrate"; and "single-pointed, sharp-tipped." The "curved-to-flat" type was the most represented; of the 20 total items of this type, 4 were recovered from a single burial (see below).

TABLE IV.25
FREQUENCIES OF MORPHOLOGICAL TYPES FROM BURIALS AND TOTAL COLLECTION

	Burial		Total Collection	
	n	%	n	%
Antler, Distal End Long	2	14	11	12
Bead	0	0	3	3
Bi-Pointed Pin	2	14	12	13
Curved-to-Flat	4	29	20	22
Serrated	1	7	9	9
Single-Pointed, Blunt	0	0	10	11
Single-Pointed, Crude	0	0	1	1
Single-Pointed, Sharp	1	7	20	22
Tube	0	0	6	6
Tube, Single-Holed	0	0	1	1
Unidentifiable	4	29	0	0
Total	14	100	93	100

Gender differences were not enlightening. Only six burials with identifiable modified-bone implements were classifiable to gender. These consisted of one double-interment of a male and a female, three female interments, and two male interments. The double-burial contained one "single-pointed, sharp-tipped implement." One modified-bone item was associated with each of the three female interments, including a "serrated" cervid scapula, an "antler, distal end," and a "bi-pointed" implement. The two male interments included one "antler, distal end" and the four "curved-to-flat" items noted above. These items were all associated with Burial 81 at CCO-696. The recovery of these implements with a single burial suggests the elevated status or specialized occupation of this individual. These items are commonly referred to as strigils, or "sweat scrapers," and were used by members of sweat lodges. In terms of artifact function, the females had 1 specimen each from the Animal Procurement, the Animal Processing, and the Lithic Processing groups, while the males had 1 implement from the Lithic Processing group and 4 from the Personal–Ceremonial group. The male/female interment had one item from the Fiber Processing group. Perhaps the pattern of females procuring small animals and processing animals and males working on lithics did prevail, but a larger sample is needed to give support to this notion.

While the positive associations have limited usefulness due to small sample size, identifying the types in the overall collection that are absent from the burials is of interest. Namely beads, tubes, and "single-holed tubes" (whistles), all assumed to be nonutilitarian items, were found within the midden proper rather than associated with burials. In contrast, the "utilitarian" items of the general "single-pointed" category were present almost exclusively within the midden, as expected.

Faunal Remains

It is assumed that animals were exploited primarily for meat acquisition, with co-harvesting for use as modified implements. In order to maintain the same parameters, comparisons between the modified-bone and faunal assemblages are limited to those materials recovered from excavation units, thereby eliminating random, individual items. The sample from nonburial, nonexcavation unit locations, especially the deep component at CCO-696, was primarily recovered using a backhoe, thus the specimens tended to be larger, more readily visible items.

By the very nature of modification, the modified-bone specimens were less identifiable to species than other faunal specimens. This fact was reflected in the number of items identifiable to species-level classification—only 16.4% of the modified-bone assemblage from excavation units. As was the case with the faunal assemblage, the majority of the modified bone was composed of bone that was considered "unidentifiable" (83.6%). Of the identifiable items (n = 23), the classification of "artiodactyl" dominated, with 91.4%; elk and deer were represented by 1 specimen each (4.3% of all modified bone).

Because few items could be identifiable as to species, it was useful to incorporate higher orders of classification and the unidentifiable remains. The classification of the modified bone that was "unidentifiable" to species included generic designations based primarily on characteristics of the bone, and secondarily on approximate size divisions. A few items were distinguishable to the taxonomic levels of class Mammalia and class Aves. Additionally, the four size classifications of mammals include large, medium-large, medium, and small mammal. In total, there were six divisions of the unidentifiable material.

The category "medium/large" mammal was the best represented, with 45.1% of the unidentifiable modified bone, a pattern consistent with the faunal assemblage (38.1%). The high frequency of this class indicates a preference for medium to large-sized mammal bone for the manufacturing of modified-bone tools.

At the element level of classification, the majority of specimens (56.7%) were long-bone fragments. Among the remaining 103 items, "unidentifiable" (13.8%), antler (8.8%), and the generalized classification of flat bone (7.1%) were the most common elements. Identifiable elements include Artiodactyl metapodials, bird ulnae, deer scapulae, and elk tibia. Clearly, long bones from

medium- to large-sized mammals were favored for the manufacture of modified-bone implements, a pattern that is not inconsistent with the faunal data.

SUMMARY

The following statements summarize the important findings of the analysis of the modified-bone assemblage from the Los Vaqueros Project:

- Notching or serration is evident on a large mammal (probably elk) long-bone fragment from the oldest component of the project, suggesting a prototype of the serrated-bone cervid scapulae that occur in later periods.
- The functional types present in the three temporal periods suggest that utilitarian functions were common during the Lower/Middle Archaic, lithic processing gained importance in the Upper Archaic, and a more generalized scheme incorporated ceremonial functions in the Emergent.
- Animal Procurement implements made from bone tend to be for the acquisition of small-bodied animals. There is a positive relationship between those components with Animal Procurement tools and a high frequency of small, economically significant animals in the faunal collection.
- Burials generally lacked modified bone (only 10 burials had any modified bone associated), except for Burial 81 from site CCO-696, which contained 40% of the burial-associated items.
- Those items commonly recovered with central California burials (i.e., beads, tubes, whistles) were not found with Los Vaqueros interments.
- Both a male and a female interment had an "antler, distal end" implement; only a female had a "bi-pointed, fine-tipped" implement and a "serrated" scapula; only a male had (4) "curved-to-flat" implements; and the male/female interment had a "single-pointed, sharp-tipped" implement.
- Variability of morphologically and functionally defined associations appears based on the gender of an interment, but these observations were made on a small sample size.
- The modified-bone assemblage was within the range of animals exploited for subsistence purposes as suggested by the faunal assemblage; specifically, those identifiable animals consist of members of the Artiodactyl family: elk and deer.
- Leg elements from medium-large mammals (probably deer) are the most commonly used bone for modified-bone implements;

Conclusion

Using a morphological basis for examination of the modified-bone collection from Los Vaqueros has allowed comprehensive analysis of the data, with emphasis on the location and degree of use-wear evident on each specimen. By subsuming these morphological characteristics into functional classifications, it has been possible to make some interpretations regarding past human behavioral patterns.

Despite the large numbers of faunal remains from within the entire project area (n = 14,899), there is a relatively small amount of modified bone in the assemblages overall (n = 238, or just 1.6 %). There is an even smaller number of modified-bone items complete enough to be classifiable into morphological groups (93 items). This being the case, interpretations are tentative and are more useful when combined with other archaeological data (e.g., projectile-point and shell-bead distribution).

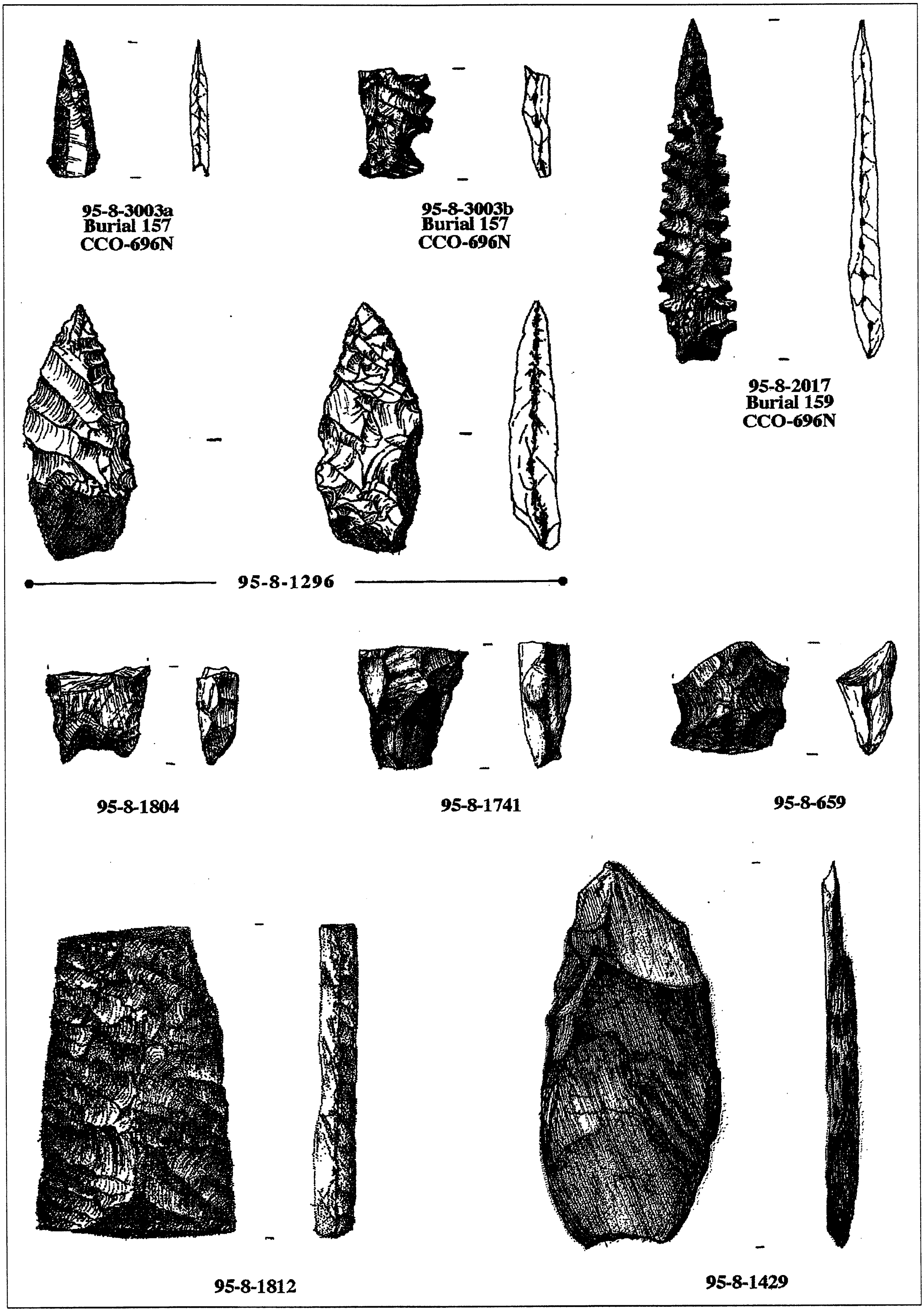


Figure IV.1. Small Projectile Points and Bifaces from CA-CCO-696. Illustrations by Julia Jarrett.

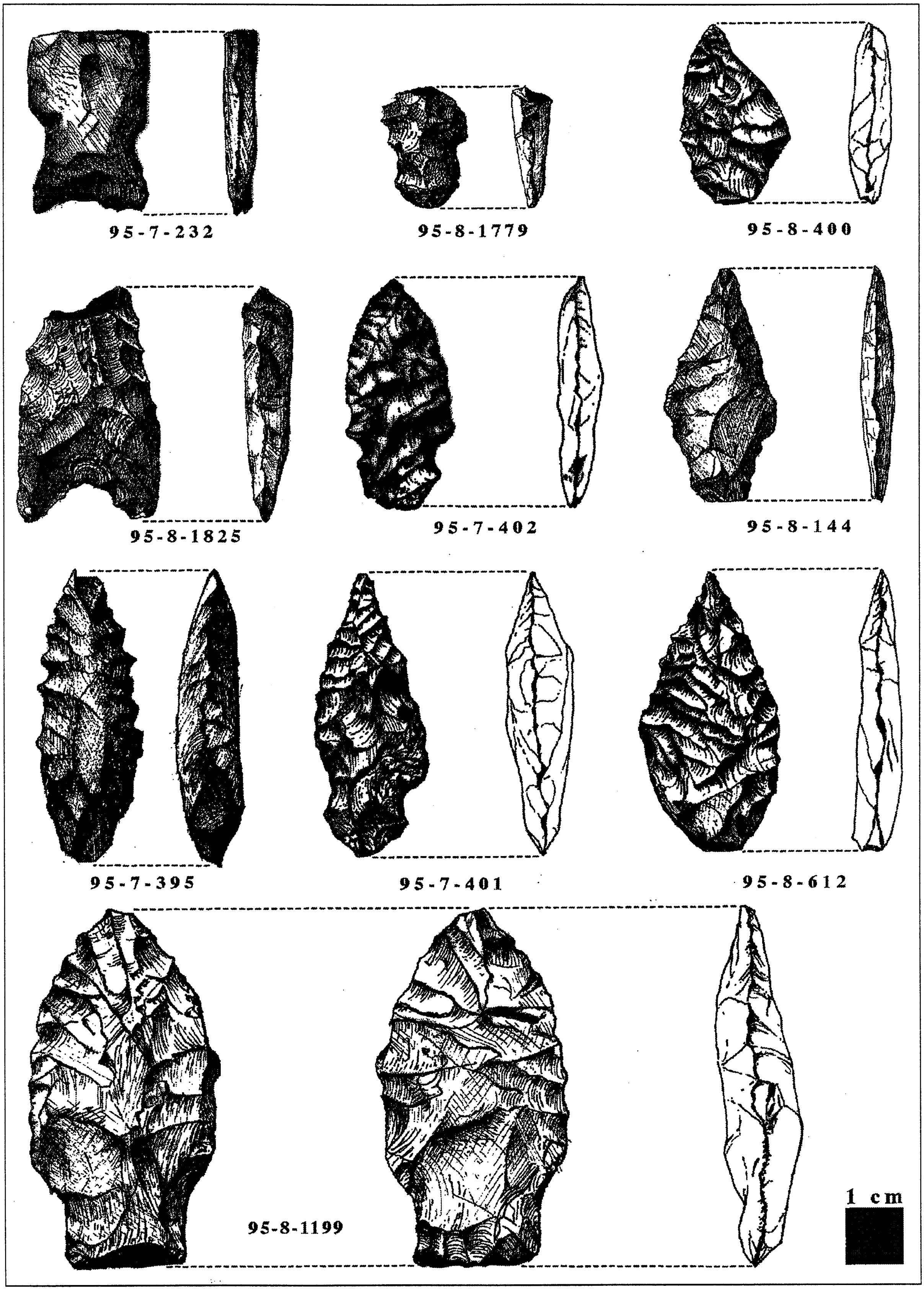


Figure IV.2. Large Projectile Points from Los Vaqueros Sites (shown actual size). Illustrations by Julia Jarrett.

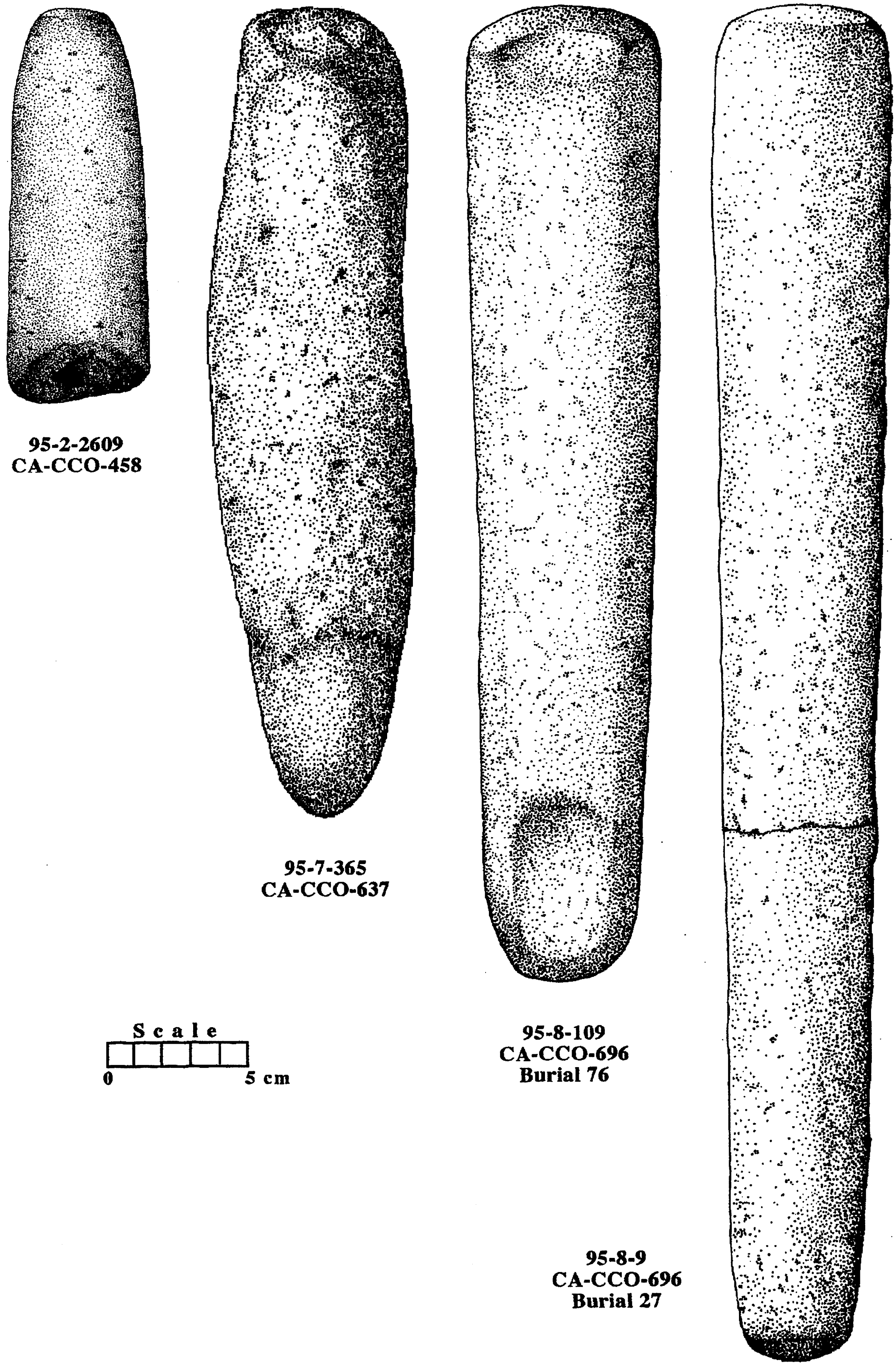


Figure IV.3. Pestles from Los Vaqueros Reservoir Area Sites. Illustrations by Julia Jarrett.

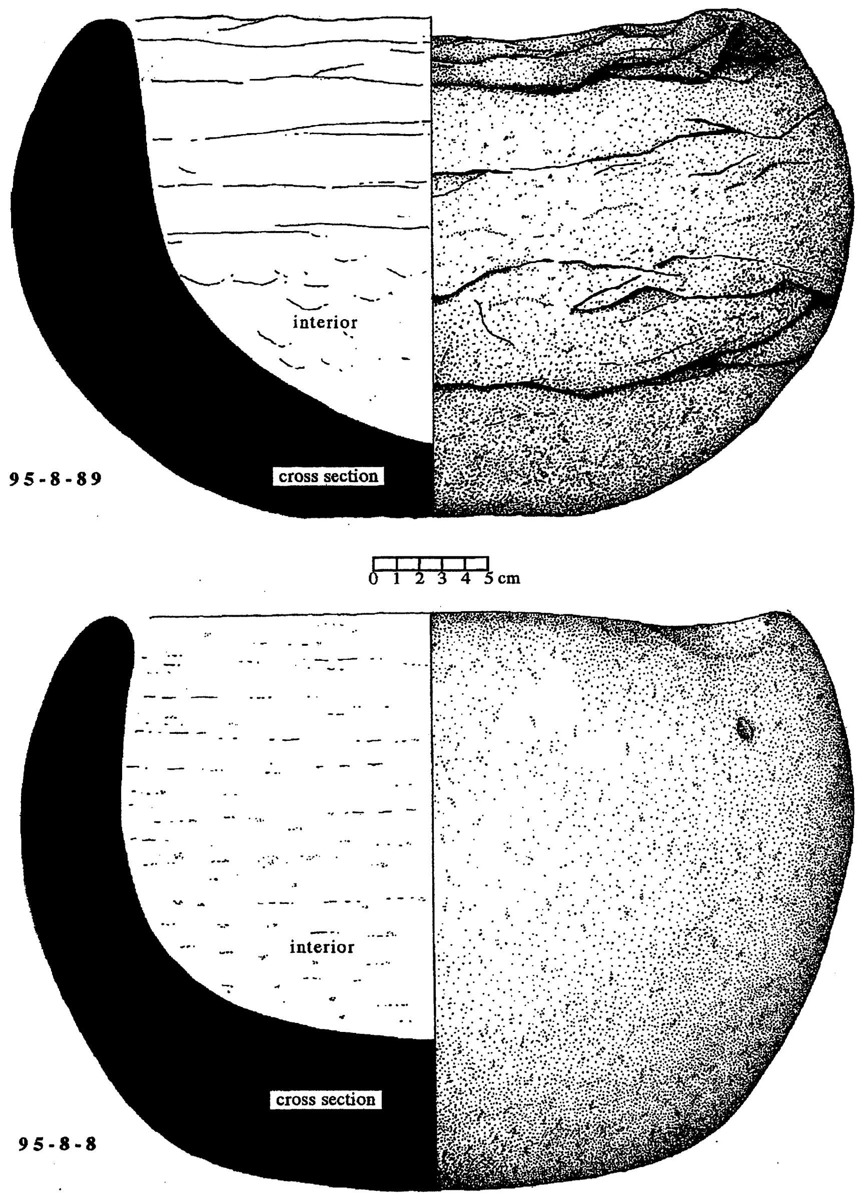


Figure IV.4. Bowl Mortars from CA-CCO-696. Mortar above found with Burial 57; below, with Burial 27. Illustrations by Julia Jarrett.

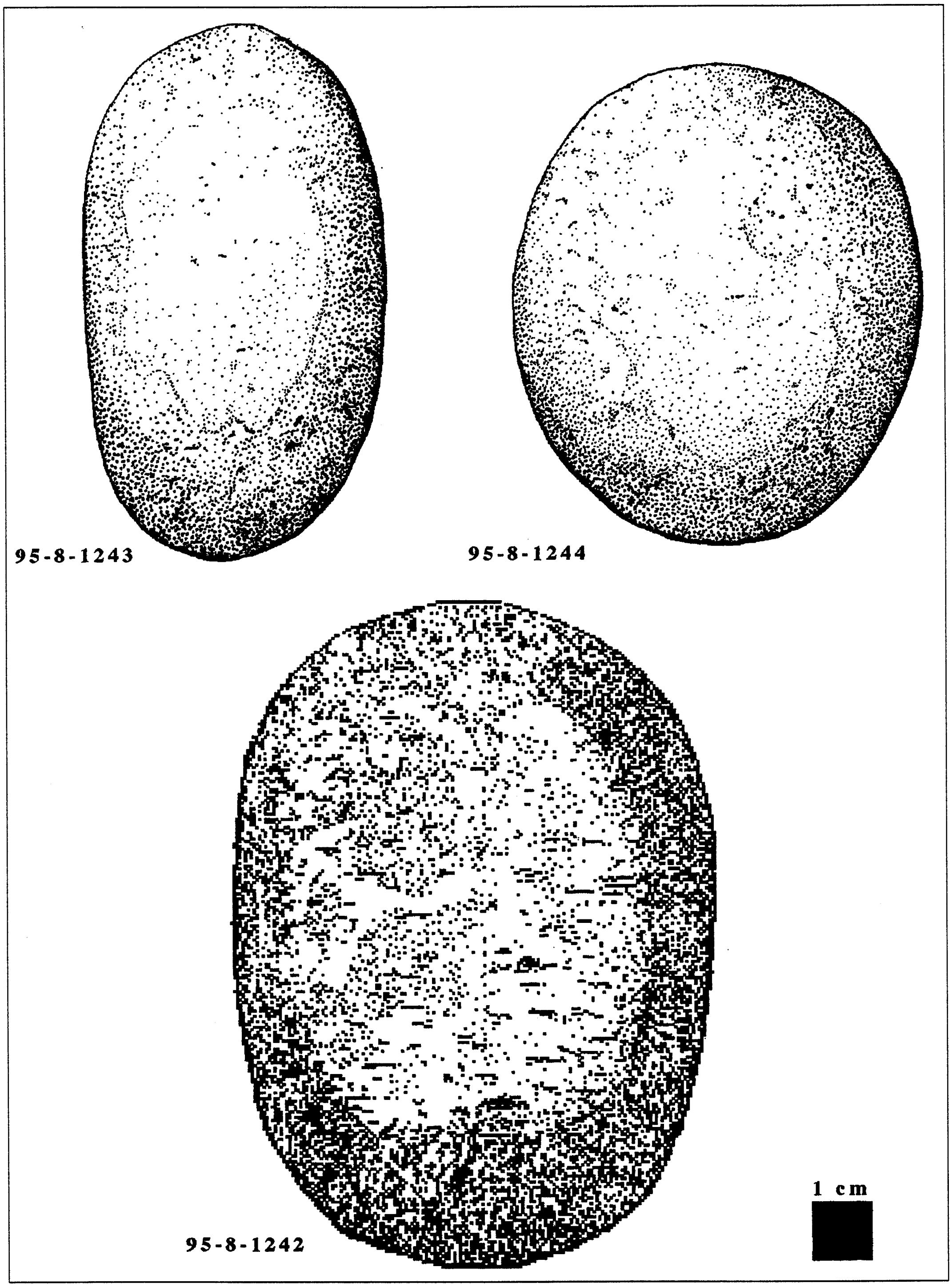


Figure IV.5. Items in the Handstone Cache from the Lower Archaic Component at CA-CCO-696, Los Vaqueros. Illustrations by Julia Jarrett.

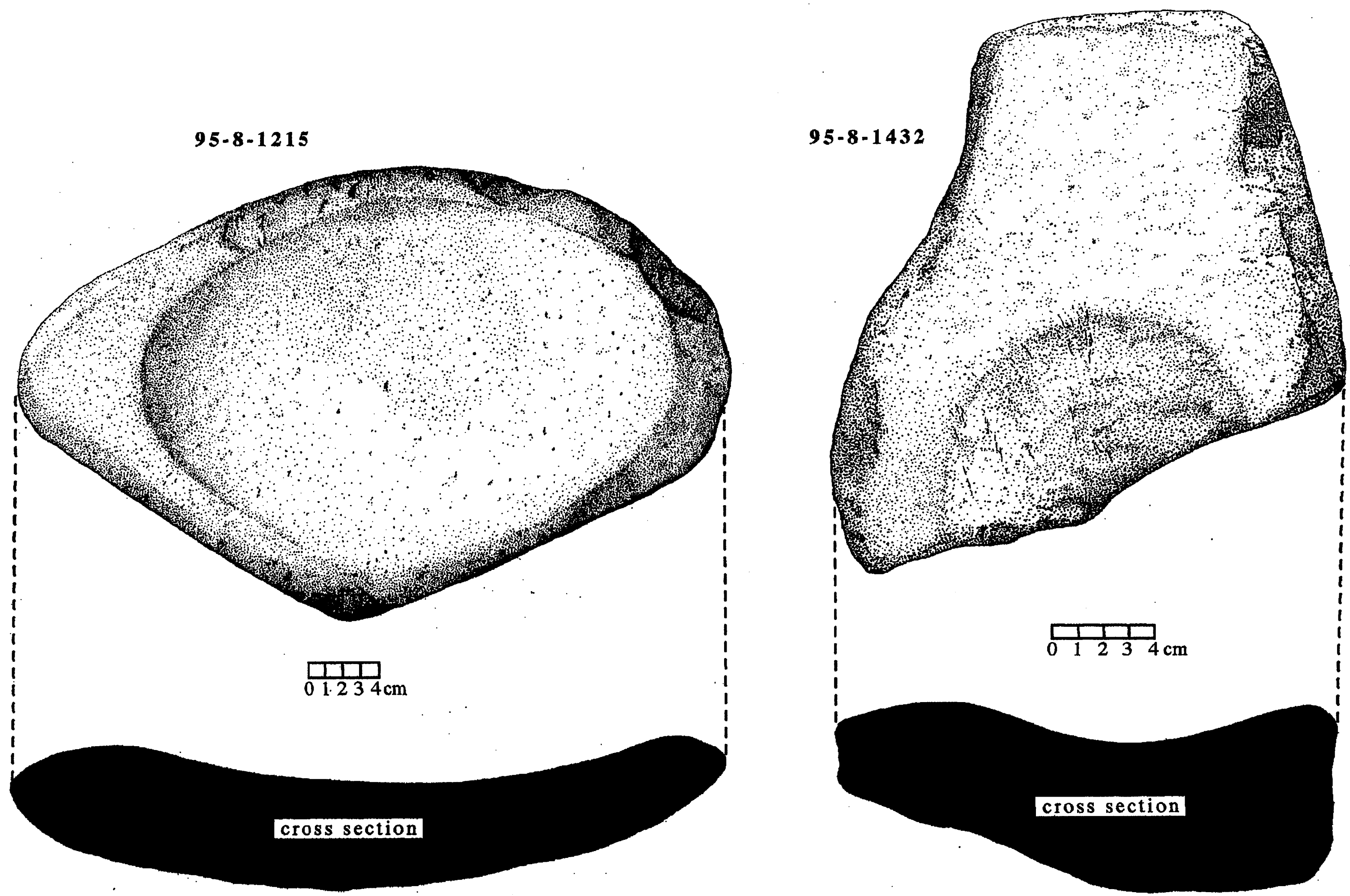


Figure IV. 6. Millingslabs from the Deep Component at CA-CCO-696, Los Vaqueros Project. Illustrations by Julia Jarrett.

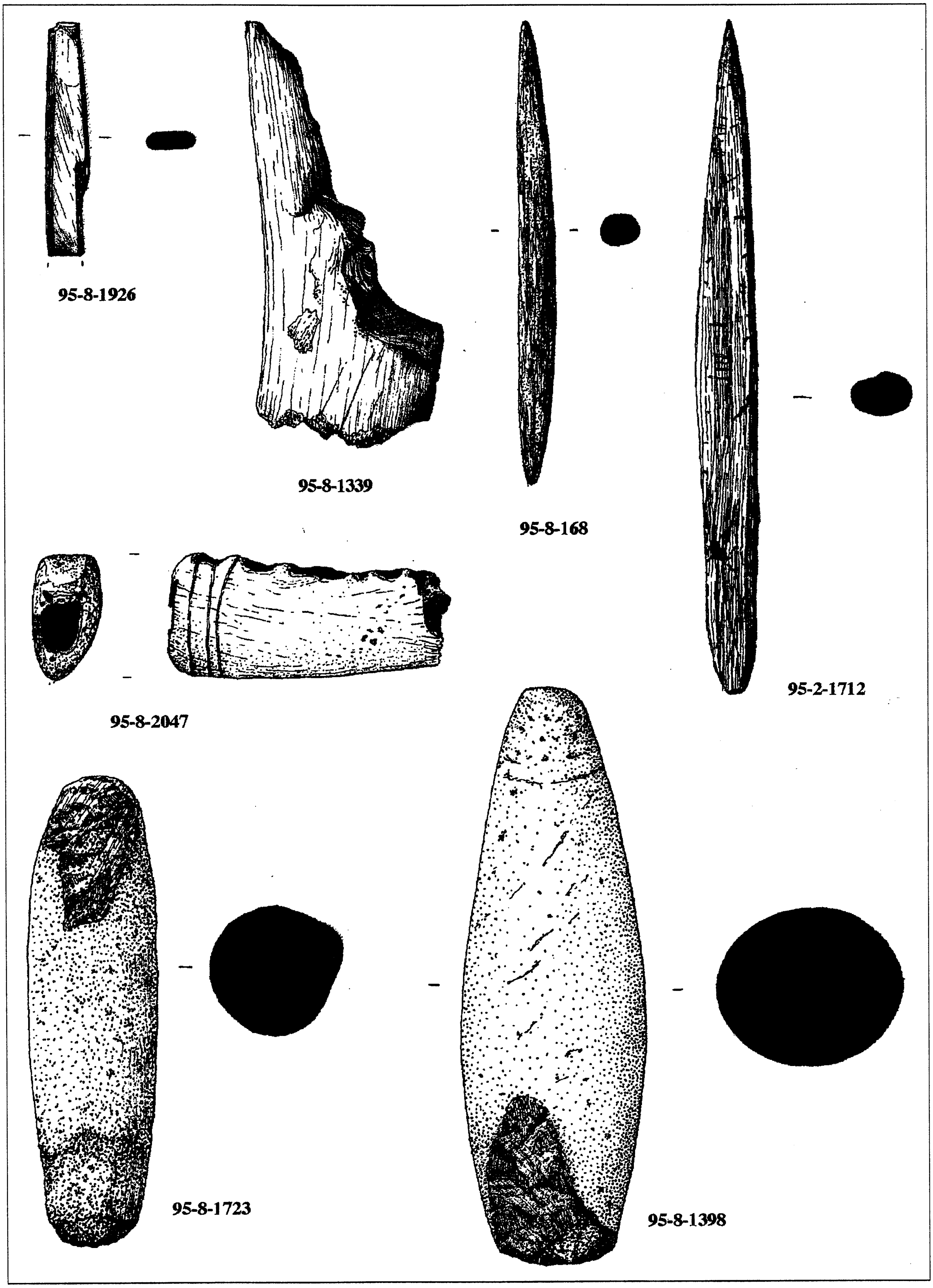


Figure IV.7. Selected Bone and Stone Artifacts, Shown Actual Size. Illustrations by Julia Jarrett.

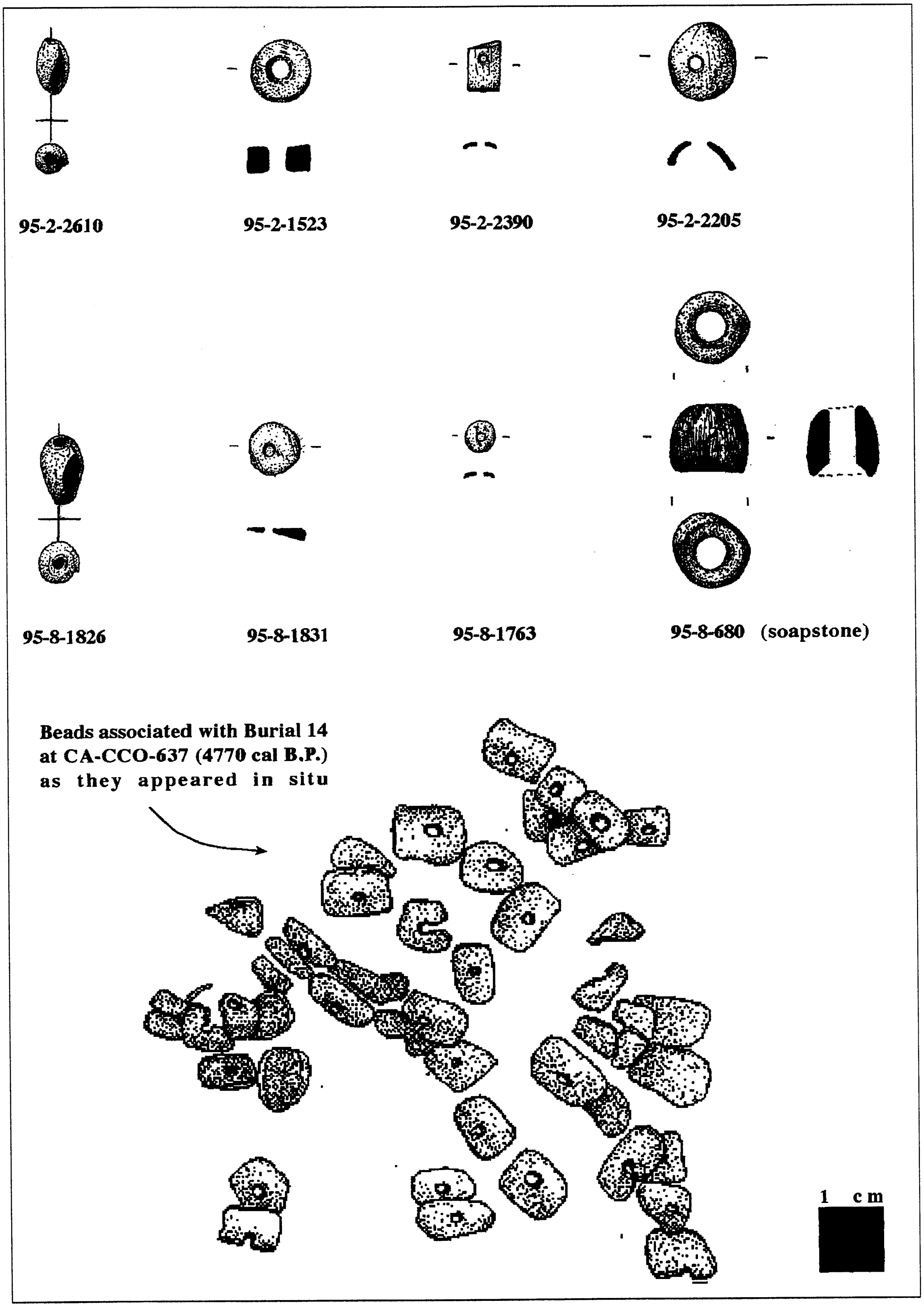


Figure IV.8. Selected Shell Beads from Los Vaqueros Sites. Illustrations by Julia Jarrett.

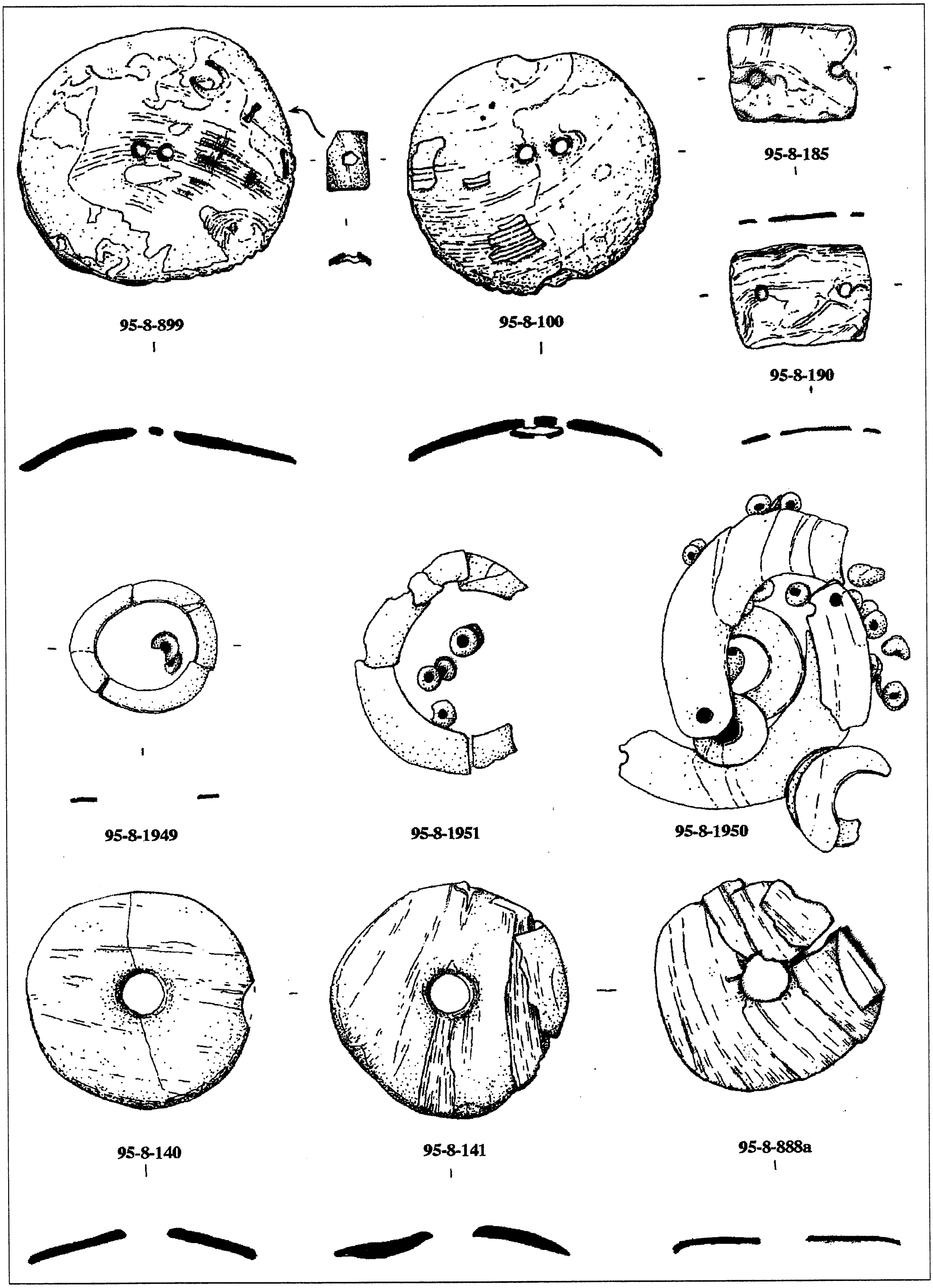


Figure IV.9. Haliotis Shell Ornaments from CA-CCO-696, Los Vaqueros Project. Illustrations by Julia Jarrett.

CHAPTER 8
CHRONOMETRIC STUDIES

RADIOCARBON ANALYSIS

INTRODUCTION

Radiometric analysis was conducted to establish and refine the chronology of natural and cultural contexts in the Los Vaqueros Project area. Because radiometric analysis is a complex process, it is necessary here to summarize several principles involved in the dating of radiocarbon materials. The discussion below emphasizes the nature of radiocarbon, the dating of soil organic matter, and the dating methods used as part of this investigation. The analysis focuses on the spatial, temporal, and paleoecological significance of the dating results.

Nature of Radiocarbon Dating

Radiocarbon (^{14}C) is produced primarily by the interaction of cosmic radiation with nitrogen in the earth's atmosphere. After mixing with carbon dioxide (CO_2), ^{14}C is readily assimilated by plants and other living organisms. When plants and animals die, however, ^{14}C levels start to decrease because they no longer absorb new carbon. Since ^{14}C is known to decay at a rate that approaches a half-life of 5,730 years, the amount of decay reflects the age of biogenic carbon as compared to modern levels of ^{14}C activity (Geyh and Schleicher 1990). For consistency, the half-life of ^{14}C is set at 5,568 years by international convention.

Measured ^{14}C ages also reflect the enrichment or depletion (fractionation) of stable carbon isotopes C-13 and C-12 as determined by the metabolic and environmental history of a sample (Geyh and Schleicher 1990). For this reason, C-13/C-12 ratios are often used to correct measured ^{14}C ages to conventional ^{14}C ages, which are expressed in years before present (B.P.), with present equaling A.D. 1950.

Carbon isotope ratios are also applied to the problem of reconstructing past environments for archaeological studies (DeNiro 1987; Tieszen 1991; van der Merwe 1982). This approach is based on the recognition that most plants either metabolize carbon dioxide along Calvin pathways (C3), or along Hatch-Slack (C4) pathways during photosynthesis (Stout, Rafter, and Troughton 1975). Studies have determined that both plant types have distinctive $^{13}C/^{12}C$ ratios, with C3 type plants ranging between -33 to -22‰, and C4 type plants ranging between -16 to -9‰ (DeNiro 1987). It has also been shown that lower temperatures and regular amounts of moisture favor the growth of C3 plants, whereas higher temperatures and restricted amounts of moisture favor the growth of C4 plants (Krishnamurthy and Bhattacharya 1989). By monitoring variations in the proportion of C3 and C4 plants over time, $^{13}C/^{12}C$ ratios have been used to indicate paleoecological conditions (Balesdent, Girardin, and Mariotti 1993; Cerling et al. 1989; Dorn and DeNiro 1987; Stuiver and Braziunas 1987).

Due to fluctuations in the concentration of atmospheric ^{14}C over time (the de Vries effect), conventional ^{14}C ages can differ from the actual ages in solar years. This difference amounts to only +/- 200 years over the past 2,000 years, but increases to -800 years between 2,000 and 7,300 years ago, and to -1,100 years between 8,000 and 11,000 years ago (Geyh and Schleicher 1990:168). To compensate for these differences, high-precision calibration programs were developed that convert conventional ^{14}C ages into calibrated years (cal B.P.) (Stuiver and Reimer 1993). The application of calibrated ages is especially important when attempting to order and compare groups of related samples (Buck, Litton, and Scott 1994). Calibrated dates that range between 2370 and 2700 cal B.P. must be considered as approximate, since they correspond to an essentially flat calibration curve caused by a significant decline in atmospheric ^{14}C levels at that time (Stuiver 1991:49).

Soil Dating

The use of soils for radiocarbon dating has become relatively routine for many archaeological, geoarchaeological, geomorphological, and pedological studies (Haas, Dalby, and Ferring 1991; Haas, Holliday, and Stuckenrath 1986; Mandel 1995; Stein 1992; Yaalon 1971). As such, considerable research has been conducted into the subject of soil dating (Matthews 1985; Ruhe 1983; Scharpenseel 1976). Soils that are buried or at the surface can be dated because they contain certain amounts of biogenic carbon in the form of organic matter or secondary carbonates. Soil organic matter (SOM) is formed by the physical and chemical transformation of plants and animals that died at different times. The type and amount of SOM that is available for dating are determined by the differential decomposition, humification, and translocation of SOM in any given soil profile.

The accuracy of soil dates depends on the researcher's ability to select samples that will minimize potential contaminants (Scharpenseel 1976), and to properly interpret the context of the sample (Matthews 1985). The ^{14}C age of a soil or sediment reflects the apparent mean residence time (AMRT) of the total organic content of the analyzed material. Since soil formation occurs over time, AMRT dates are usually younger that the true age of the soil. When younger carbons continue to accumulate in soils up to the present, AMRT dates can be as little as one-half of the true age of the soil. When the accumulation of younger carbons is slowed or stopped by deposition or burial, AMRT dates more closely approximate the true age of the soil. Understood in this way, the ^{14}C age of a soil does not mark a single time or event, but reflects the influence of multiple processes that affect the soil–carbon system over time.

LOS VAQUEROS SAMPLE SELECTION AND DATING METHODS

Sample selection was governed by the availability of well-defined contexts that contained datable materials. Charcoal samples were collected whenever possible for dating purposes. Soil samples were collected from the near the bottom of the A horizon or the top of the B horizon (if present), in accordance with studies by Scharpenseel (1976). Samples were prioritized and submitted for radiocarbon analyses on the basis of sample size, material type, associated context, and research needs. The material type and sampling location of individual samples is presented in Table IV.26.

A total of 61 samples were submitted to Beta Analytic, Inc. (Beta), of Coral Gables, Florida, for pretreatment and radiometric analysis. Beta reported that 5 of these samples were unsuitable for dating purposes following pretreatments. Standard radiometric analysis was performed on 1 wood sample and 18 charcoal samples using conventional techniques. These samples were crushed and dispersed in deionized water and alternately washed with acid-alkali-acid to eliminate carbonates, remove mechanical contaminants and secondary organic acids, and to neutralize the solution. The remaining materials were analyzed by synthesizing the carbon to benzene, measuring the ^{14}C content in a liquid scintillation spectrometer, and calculating the sample's radiocarbon age.

Special handling and pre treatments were required for 1 mixed charcoal-sediment sample and 25 organic sediment (soil) samples that contained low levels of carbon. These samples were crushed, dispersed, and washed with acid to eliminate carbonates. Because primary carbon is soluble in alkali, however, secondary organic acids were not removed from the samples using alkali washes. The remaining materials were processed and analyzed using the conventional techniques described above.

Accelerator-mass-spectrometry (AMS) analysis was performed on 11 small samples of charcoal. These samples were alternately washed in acid–alkali–acid to eliminate absorbed CO_2, and rinsed in deionized water to remove organic acids and carbonates. The samples were combusted to convert the organic carbon to carbon dioxide that was then reduced to graphite. Beta Analytic sent the graphite samples for AMS analysis at one of three laboratories: Institute of Geological and Nuclear Sciences (GNS) in Lower Hutt, New Zealand; Oxford University (Ox) in Oxford, England; or Eidgenossische Technische Hochschule University (ETH) in Zurich, Switzerland.

DATING RESULTS AND CALIBRATION

Radiocarbon dates were obtained for 56 samples collected from 20 locations in the project area. The samples consisted of 26 soil-sediment samples and 30 charcoal samples. Most of the dated samples (44) were collected from 15 locations in the reservoir area, while the remaining 12 samples were collected from 5 locations along the Pipeline Route to the north of the reservoir area. In all, 20 dates (35%) were obtained from cultural contexts and 36 dates (65%) were obtained from natural contexts. Further details regarding individual samples are presented in Table IV.26.

We assume that 10,000 B.P. marks the Pleistocene-Holocene boundary, and have divided the Holocene into three equal segments as follows:

late Holocene (3300 B.P. to present)
middle Holocene (6600 to 3300 B.P.)
early Holocene (10,000 to 6600 B.P.)

All of the ^{14}C dates are reported in calibrated years before present (cal B.P.); measured and conventional ^{14}C ages are provided in Table IV.26. All dates greater than 7210 B.P. were calibrated according to the bidecadal data set (Method A) using the computer program developed by Stuiver and Reimer (1993). All dates less than 7210 B.P. were calibrated by Beta Analytic according to the methods outlined by Stuiver et al. (1993). To avoid confusion between dates from natural and cultural contexts, the two are reported separately in most cases. For instance, the dates obtained from soil in two buried bedrock mortar (BRM) cups at CA-CCO-459 (Beta-77472, Beta-81783) are reported as natural dates because they reflect the age of geological processes that followed the cultural use of the cups.

The individual dates range from 250 to 15,710 cal B.P., encompassing most of the Holocene and part of the late Pleistocene. The youngest date (250 cal B.P.) is from a cultural context (Feature 1) at CCO-468, while the oldest date (15,710 cal B.P) is from a natural context (Deep Unit Trench) at CCO-696. The most frequent dates include 4 samples that cluster within 20 years of 2355 cal B.P., and identical dates represented by two samples each at 1320 cal B.P. and 1610 cal B.P. The percentage of dates for each major time period is as follows:

late Holocene – 56%
middle Holocene – 21%
early Holocene – 16%
Pleistocene – 7%

The frequency of natural and cultural dates is summarized for the major time periods in Figure IV.10. No calibrated dates represent the time between 3500 to 4700, 6400 to 7100, and 7500 to 8400 B.P., and larger portions of the late Pleistocene. It is important to note that the Pleistocene-age dates are from natural contexts—not cultural contexts.

Dates were obtained from depths ranging from 10 to 760 cm below the modern ground surface. Despite considerable variability in the age and depth of individual ^{14}C samples, comparisons indicate that the dates are generally older with increasing depth. Variations in the average depth of dated natural and cultural contexts are summarized for each major time period in Figure IV.11. The average depth of ^{14}C samples for all contexts is as follows:

late Holocene - 179 cm
middle Holocene - 214 cm
early Holocene - 309 cm
Pleistocene - 472 cm

TABLE IV.26
RADIOCARBON DATES FROM THE LOS VAQUEROS PROJECT

CULTURAL CONTEXTS

Laboratory Number	*Project # (LVAP)*	*Site (CA-) or Area*	*Provenience or Location*	*General Context*	*Strat. Unit/ Soil Horizon*	*Depth (cm)*	*Measured ^{14}C Age B.P.*	*$^{13}C/^{12}C$ Ratio*	*Conventional ^{14}C B.P*	*Cal Yrs. B.P.*
Beta-81782	21	CCO-458	Burial 1	Cultural	Brentwood/A	100	420 +/- 40	-24.20	430 +/- 40	465
Beta-81781	20	CCO-459	Feature 3	Cultural	II/Cub	54-69	630 +/- 60	-26.00	620 +/- 60	605
Beta-81780	19	CCO-459	Feature 2	Cultural	II/Cub	77-99	1340 +/- 70	-26.10	1320 +/- 70	1265
Beta-90636	46	CCO-468	Feature 1	Cultural	Brentwood/A	0-20	80 +/- 70	-26.20	60 +/- 70	250
Beta-90637	47	CCO-636	Feature 1	Cultural	I f/A	50-60	1700 +/- 50	-27.60	1660 +/- 50	1540
Beta-77470	3	CCO-637	Feature 1	Cultural	I/Ab	100-110	2520 +/- 100	-26.70	2500 +/- 100	2585
Beta-93708	52	CCO-637	Burial 14	Cultural	I/Ab	182	4160 +/- 80	-26.10	4140 +/- 80	4770
Beta-93706	50	CCO-637	Burial 5	Cultural	I/Ab	155	4960 +/- 90	-25.60	4950 +/- 90	5665
Beta-93707	51	CCO-637	Burial 7	Cultural	I/Ab	191	5090 +/- 80	-24.70	5090 +/- 80	5795
Beta-93714	58	CCO-696	Burial 157	Cultural	Vaqueros/Ab	126	800 +/- 40	-25.80	790 +/- 40	690
Beta-93709	53	CCO-696	Burial 7	Cultural	Vaqueros/Ab	115	1490 +/- 70	-27.30	1450 +/- 70	1320
Beta-93711	55	CCO-696	Burial 48	Cultural	Vaqueros/Ab	106	1770 +/- 80	-27.50	1730 +/- 80	1610
Beta-90633	43	CCO-696	Burial 139	Cultural	Vaqueros/Ab	114	1930 +/-90	-26.80	1900 +/-90	1840
Beta-93710	54	CCO-696	Burial 30	Cultural	Vaqueros/Ab	109	2370 +/- 80	-26.70	2350 +/- 80	2345
Beta-93712	56	CCO-696	Burial 73	Cultural	Vaqueros/Ab	114	2410 +/- 80	-26.80	2380 +/- 80	2355
Beta-90634	44	CCO-696	Feature 6	Cultural	Vaqueros/Ab	102	2440 +/- 50	-27.60	2390 +/- 50	2355
Beta-93713	57	CCO-696	Burial 86	Cultural	Vaqueros/Ab	109	2700 +/- 90	-26.80	2670 +/- 90	2765
Beta-94980	62	CCO-696	Burial 160	Cultural	Kellogg/Ab	325-380	6550 +/- 80	-25.20	6550 +/- 80	7400
Beta-93715	59	CCO-696	Trench 7-27-1	Cultural	Kellogg/Ab	320-375	8470 +/- 100	-26.90	8440 +/- 100	9440
Beta-85993	38	CCO-696	D.U., NW1	Cultural	Kellogg/Ab	390-415	8830 +/-60	-26.40	8810 +/- 60	9870
Not Submitted	42	-	-	-	-	-	-	-	-	-
-	49	CCO-696	Deep Exposure	Cultural	Kellogg/Ab	375	Unsuitable	-	-	-
-	61	CCO-696	Feature 20	Cultural	Vaqueros/Ab	-	Unsuitable	-	-	-

NATURAL CONTEXTS

Laboratory Number	*Project # (LVAP)*	*Site (CA-) or Area*	*Provenience or Location*	*General Context*	*Strat. Unit/ Soil Horizon*	*Depth (cm)*	*Measured ^{14}C Age B.P.*	*$^{13}C/^{12}C$ Ratio*	*Conventional ^{14}C Age B.P.*	*Cal Yrs. B.P.*
Beta-77471	4	Borrow Area	Live Oak	Natural	Channel/Coxb	240	1980 +/- 70	-28.00	1940 +/- 70	1880
Beta-83287	26	CCO-458	Profile 2	Natural	Brentwood/A	40-60	370 +/- 90	-23.80	390 +/- 90	475
Beta-83286	25	CCO-458	Profile 2	Natural	Channel/Cub	185-200	1120 +/- 90	-24.90	1130 +/- 90	1030
Beta-83288	27	CCO-458	Profile 2	Natural	Vaqueros/Ab	105-115	2580 +/- 80	-26.20	2560 +/- 80	2735
Beta-83289	28	CCO-458	Profile 2	Natural	Channel/Ab	195-205	3320 +/- 60	-26.70	3290 +/- 60	3480

TABLE IV.26, Natural Contexts, continued

Laboratory Number	*Project # (LVAP)*	*Site (CA-) or Area*	*Provenience or Location*	*General Context*	*Strat. Unit/ Soil Horizon*	*Depth (cm)*	*Measured ^{14}C Age B.P.*	*$^{13}C/^{12}C$ Ratio*	*Conventional ^{14}C Age B.P.*	*Cal Yrs. B.P.*
Beta-81783	22	CCO-459	BRM Cup 16	Natural	II/Ab	50	420 +/- 40	-27.50	430 +/- 40	500
Beta-77472	5	CCO-459	BRM Cup 10	Natural	II/Cub	85-105	980 +/- 50	-25.00	980 +/- 50	920
Beta-77473	6	CCO-459	Trench 2	Natural	I/Ab	80-100	1740 +/- 60	-25.00	1740 +/- 60	1620
Beta-85994	39	CCO-696	Exp. 5 Trench	Natural	Brentwood/Cu	290-310	930 +/- 80	-27.20	900 +/- 80	780
Beta-83285	24	CCO-696	Trench 1	Natural	Channel/ACub	190-210	1730 +/- 140	-25.10	1730 +/- 140	1610
Beta-83284	23	CCO-696	Trench 1	Natural	Channel/Cub	165-175	1830 +/- 50	-24.90	1840 +/- 50	1740
Beta-90635	45	CCO-696	Deep Expos.	Natural	Pleistocene/Ab	725	13210 +/- 150	-26.60	13180 +/- 150	15710
Beta-83294	33	Dam Area	Profile 5	Natural	Brentwood/Cu	125-145	560 +/- 190	-25.90	550 +/- 190	540
Beta-90638	48	Dam Area	Profile 5	Natural	Brentwood/Cu	150-160	760 +/- 40	-26.80	730 +/- 40	665
Beta-83295	34	Dam Area	Profile 5	Natural	Channel/ACub	220	1290 +/- 60	-26.00	1280 +/- 60	1215
Beta-93716	60	Dam Area	East Channel	Natural	Channel/Cgb	750-770	2490 +/- 60	-30.50	2410 +/- 60	2365
Beta-83291	30	Dam Area	Profile 5	Natural	Vaqueros/Ab	270-280	4660 +/- 90	-26.30	4640 +/- 90	5315
Beta-83293	32	Dam Area	Profile 5	Natural	Channel/Ab	180-200	4950 +/- 50	-28.20	4900 +/- 50	5625
Beta-83292	31	Dam Area	Profile 5	Natural	Vaqueros/Ab	260-275	5070 +/- 70	-24.70	5080 +/- 70	5810
Beta-85995	40	Dam Area	Profile 5	Natural	Vaqueros/Coxb	445-455	6230 +/- 50	-19.40	6320 +/-50	7210
Beta-83290	29	Dam Area	Profile 5	Natural	Kellogg/Ab	390-410	7760 +/- 110	-26.20	7740 +/- 110	8445
Beta-79403	11	Dry Creek	9/22/05	Natural	III/Bk	25-40	8090 +/- 80	-27.10	8050 +/- 80	8965
Beta-79402	10	Dry Creek	9/22/05	Natural	I/Btkb	140-160	Unsuitable	-	-	-
Beta-75243	2	Kellogg Crk	Profile 1	Natural	Channel/Coxb	230-250	1470 +/- 80	-26.30	1450 +/- 80	1320
Beta-79410	18	Kellogg Crk	9/22/05	Natural	II/Bt	70-80	2900 +/- 80	-25.90	2880 +/- 80	2970
Beta-83298	37	Kellogg Crk	Debris Flow	Natural	IIIf/Ab	220-240	5030 +/- 60	-27.10	5000 +/- 60	5730
Beta-75242	1	Kellogg Crk	Profile 1	Natural	Vaqueros/Bktb	275-290	5610 +/- 80	-26.90	5580 +/- 80	6355
Beta-83297	36	Kellogg Crk	Debris Flow	Natural	IIf/Ab	360-380	6390 +/- 70	-21.60	6450 +/- 70	7355
Beta-79409	17	Kellogg Crk	9/21/05	Natural	I/Btb	170-190	7990 +/- 130	-25.90	7980 +/-130	8775
Beta-83296	35	Kellogg Crk	Debris Flow	Natural	If/Ab	555-575	9370 +/- 120	-24.50	9370 +/- 120	10355
Beta-85996	41	Kellogg Crk	Western Arm	Natural	Pleistocene/Ab	300	10010 +/- 70	-26.50	9990 +/- 70	11180
Beta-79408	16	Kellogg Crk	9/21/01	Natural	I/Bkb	90-110	Unsuitable	-	-	-
Beta-79407	15	Marsh Creek	9/21/01	Natural	III/Bk	115-135	2180 +/- 70	-24.70	2180 +/- 70	2145
Beta-79406	14	Marsh Creek	9/21/01	Natural	II/Bkb	175-195	4790 +/- 70	-26.40	4760 +/- 70	5530
Beta-79404	12	Marsh Creek	Trench 3	Natural	I/ABtb	130-140	7820 +/-220	-25.50	7810 +/- 220	8535
Beta-79405	13	Marsh Creek	9/22/01	Natural	I/ABtb	270-290	12410 +/- 150	-26.00	12400 +/- 150	14505
Beta-79401	9	Sand Creek	9/23/01	Natural	III/Bt	70-90	3270 +/- 80	-26.30	3250 +/- 80	3460
Beta-79400	8	Sand Creek	9/23/01	Natural	II/Btb	220-260	4620 +/- 70	-26.70	4590 +/- 70	5300
-	7	Sand Creek	9/23/01	Natural	I/Btb	440	Unsuitable	-	-	-

Cultural ^{14}C dates from archaeological sites in the reservoir area range from 9870 to 250 cal B.P., indicating the occurrence of the archaeological deposits from each of the following cultural periods (shown with their proposed temporal ranges per Fredrickson 1973, 1974, 1984) :

Lower Archaic (10,000 to 5000 B.P.)
Middle Archaic (5,000 to 2500 B.P.)
Upper Archaic (2500 to 950 B.P.)
Emergent (950 to 200 B.P.)

The range and average age of the cultural dates permit the archaeological deposits to be placed in temporal order (Figure IV.12). Archaeological deposits dating to the Lower Archaic were identified at CCO-637 and in the lower unit of CCO-696. Deposits dating to the Middle Archaic period were identified at CCO-637 and in the upper unit of -696. Upper Archaic-age deposits were identified at CCO-459, -636, and in the upper unit of -696. Deposits dating to the Emergent period were identified at CCO-458, -459, and -468.

A comparison of natural and cultural dates reveals that the age of natural contexts closely parallels the age of cultural contexts in the project area (Figure IV.13). Dates obtained from soil samples tend to cluster around 3,000, 5500, and 8500 cal B.P. Natural and cultural dates from the reservoir area overlap at 2-sigma standard deviations between 270 to 755 cal B.P., 2330 to 2775 cal B.P., and 5580 to 5945 cal B.P. Even though natural dates outnumber cultural dates by nearly 2 to 1, the average age of natural dates is slightly less than that of cultural dates in each major time period. The difference amounts to about 100 years in the late Holocene, 230 years in the middle Holocene, and 690 years in the early Holocene. Taken at face value, these patterns suggest that a strong correspondence exists between the age of natural and cultural contexts.

Stable Carbon Isotope Ratios

The ratio of ^{13}C to ^{12}C was measured for 54 of the 56 dated samples, but was estimated for the 2 remaining samples (Beta-77472, Beta-77473). The ratio ranges from -19.4 to -30.5, with a mean of -26.0 and a standard deviation of 1.5 for all samples combined. The $^{13}C/^{12}C$ ratio of wood and charcoal samples from natural contexts have the largest range (-19.4 to -30.5) and standard deviation (1.8), while charcoal samples from cultural contexts have the smallest range (-27.6 to -24.2) and standard deviation (0.9). The ratio for soil samples ranges from -21.6 to -28.2, with a standard deviation of 1.3. Overall, natural contexts have a slightly less negative mean ratio (-25.9) than do cultural contexts (-26.3).

Since carbon isotope ratios have potential paleoecological significance, the $^{13}C/^{12}C$ ratios were plotted by their ^{14}C age to examine change over time. The plot indicates only one significant fluctuation in $^{13}C/^{12}C$ ratio over the past 15,000 years. A "spike" in the signal around 7300 cal B.P. indicates that ratios were more than 17% less negative than the mean for all samples (Figure IV.14). This spike may mark the onset of warmer-drier environmental conditions that favors the growth of C4 type plants. During the remaining time, $^{13}C/^{12}C$ ratios varied by less than 17% from the mean of -26, suggesting that the project area may have been dominated by a relatively moderate environment that favored the growth of C3 type plants. Notably, the most negative ratio (-30.5) was obtained from a piece of wood identified as California Buckeye that dated to 2365 cal B.P. (Beta-93716). This sample was associated with other pieces of wood identified as Pacific madrone (*Arbutus menziesii*) and bigleaf maple (*Acer macrophyllum*) that were found in a deeply buried stream channel (see Appendix E).

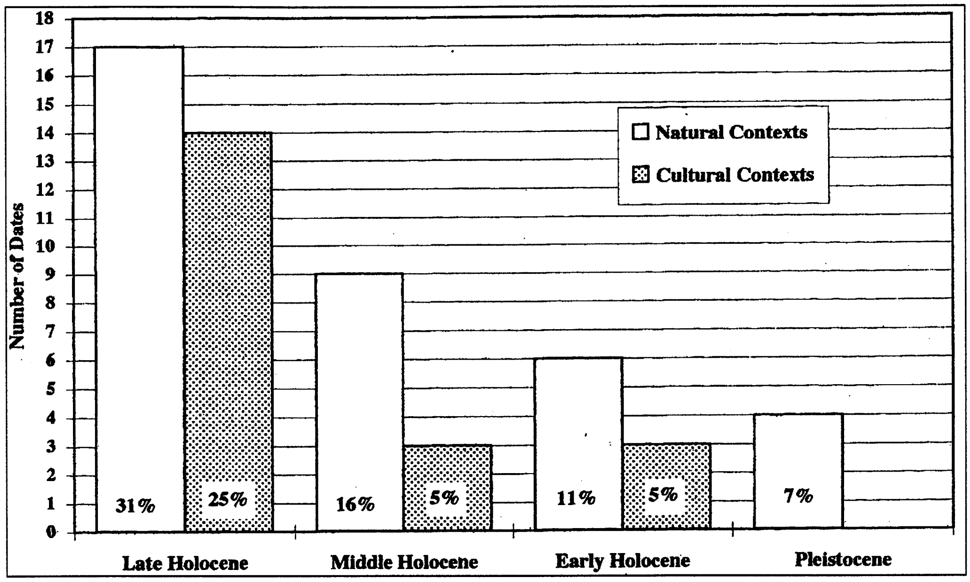


Figure IV.10. Frequency of All Radiocarbon Dates for Each Major Time Period, Los Vaqueros Project

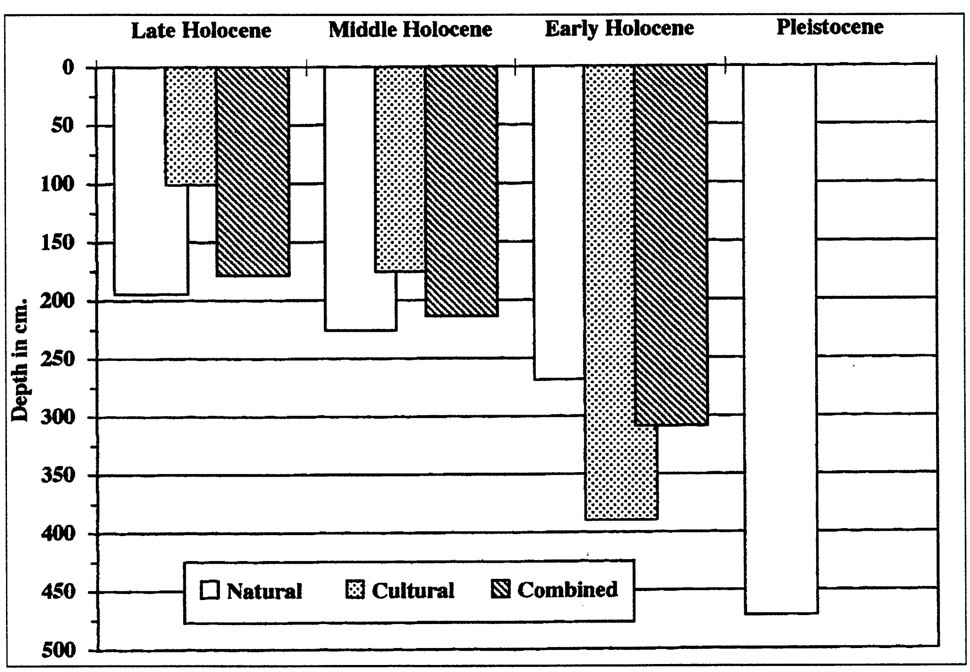


Figure IV.11. Average Depth of All Radiocarbon Dates for Each Major Time Period

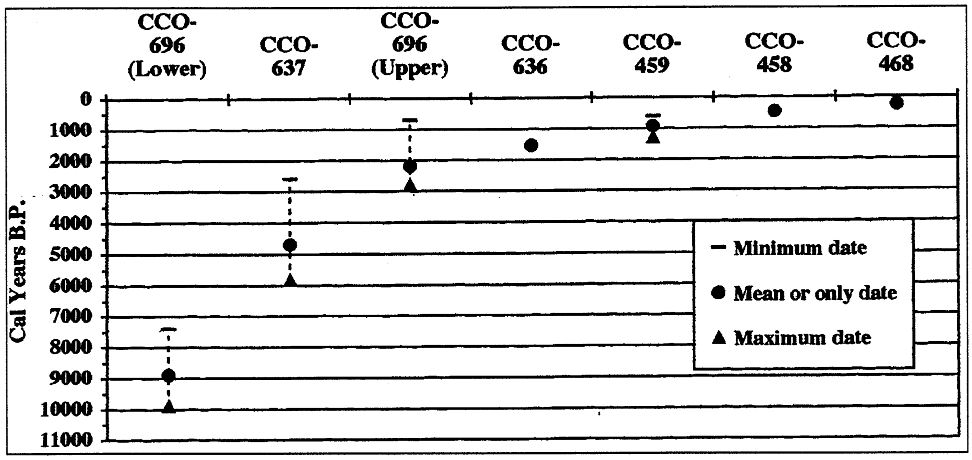


Figure IV.12. The Range and Mean of Radiocarbon Dates Obtained from Archaeological Sites in the Los Vaqueros Reservoir Area

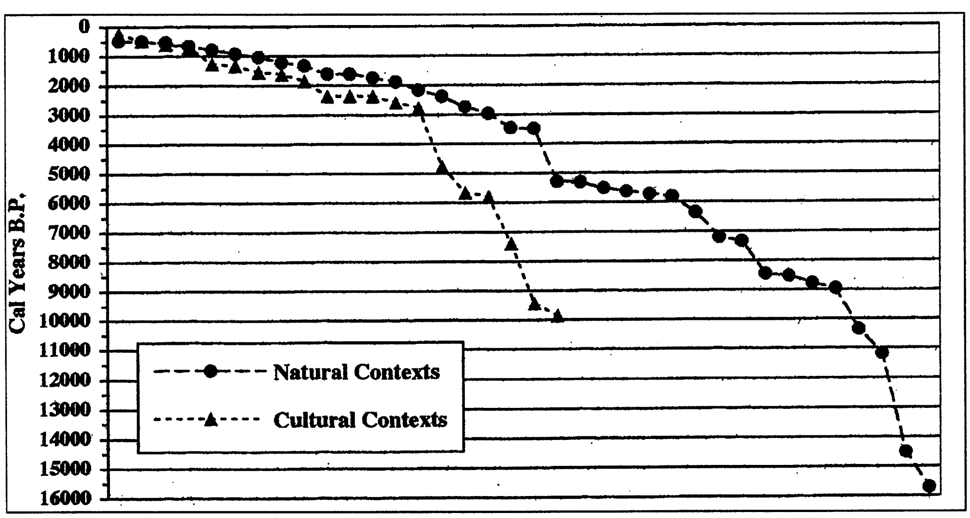


Figure IV. 13. The Relationship of All Radiocarbon Dates from Natural and Cultural Contexts

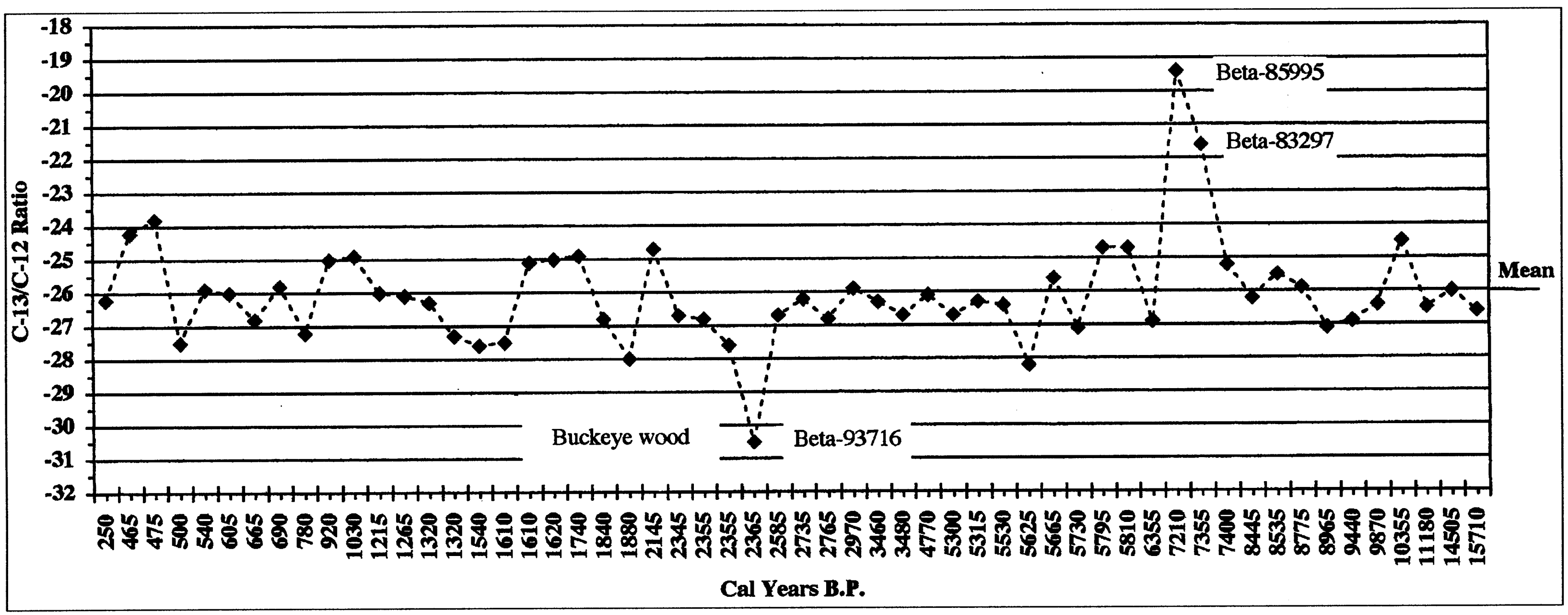


Figure IV.14. Temporal Distribution of $^{13}C/^{12}C$ Ratios for All Radiocarbon Dates

OBSIDIAN ANALYSIS

INTRODUCTION AND METHODS

More than 4,000 pieces of obsidian, including debitage and tools, were recovered from six sites during the Los Vaqueros prehistoric archaeological investigations (Table IV.27). Obsidian was recovered from stratigraphic contexts ranging from early to late Holocene in age. It was represented by specimens from five different source localities, including three sources from the North Coast Ranges (Napa Valley, Borax Lake, and Annadel) and two from the eastern Sierra (Bodie Hills and Lookout Mtn/Casa Diablo).

Since their inception in the 1960s, techniques for dating and sourcing obsidian have become increasingly important for chronological analysis (Bouey, ed. 1995; Clark 1964; Ericson 1977; Origer 1987; Origer and Wickstrom 1982; Tremaine 1993) and the understanding of prehistoric exchange systems in central California (Bouey and Basgall 1984; Ericson 1977; Jackson 1974, 1986; Jackson and Ericson 1994).

In the analysis of obsidian from Los Vaqueros sites, X-ray fluorescence (XRF) and macroscopic visual source assignments were combined with obsidian-hydration analysis in order to (1) provide independent chronological data for comparison with radiocarbon determinations; (2) define temporal parameters of different obsidian artifact types; (3) determine the temporal span of obsidian use; (4) identify periods of occupation at different sites and/or loci; and (5) examine changes in obsidian source frequency over time. In addition, technological analysis of obsidian debitage provided insight into patterns of obsidian acquisition over time.

TABLE IV.27
SUMMARY OF OBSIDIAN RECOVERED FROM LOS VAQUEROS PROJECT BY ARTIFACT TYPE AND SITE

	CA-CCO-					
Artifacts	**458**		**459**		**468**	
	n	**%**	**n**	**%**	**n**	**%**
Flakes	3,318	88.2	20	0.5	12	0.3
Small Projectile Points	126	94.0	-	-	4	3.0
Large Projectile Points	-	-	-	-	-	-
Bifaces	93	61.6	-	-	-	-
Modified Flakes	44	89.8	1	2.0	-	-
Bipolar Cores	14	93.3	-	-	-	-
Unmodified Cobble	-	-	-	-	-	-
Total	3,595		21		16	

	636		**637**		**696**	
	n	**%**	**n**	**%**	**n**	**%**
Flakes	9	0.2	61	1.6	339	9.0
Small Projectile Points	1	0.7	-	-	3	2.2
Large Projectile Points	-	-	2	22.2	7	77.8
Bifaces	1	0.7	4	2.6	53	35.1
Modified Flakes	-	-	-	-	2	4.0
Bipolar Cores	-	-	-	-	1	6.7
Unmodified Cobble	-	-	-	-	1	6.7
Total	11		67		406	100.0

Obsidian Source Assignments

Of the 4,116 obsidian specimens recovered during the project, source assignments were made for 1,258 specimens, or 31% (Table IV.28). All obsidian recovered from CCO-459, -468, -636, -637, and -696 was sourced—either visually or through XRF analysis—while only 20% (n = 728) of the 3,595 obsidian items recovered from CCO-458 was visually sourced. A total of 84 specimens from sites CCO-637 and -696 were subject to XRF analysis by Dr. Richard Hughes of the Geochemical Research Laboratory (Appendix F).

The visual sourcing was conducted by the author with the assistance of Sunshine Psota of the Anthropological Studies Center. All visually sourced specimens were examined twice and segregated into different source categories. Specimens in each category were compared to each other to test for internal consistency and were also compared to obsidian samples sourced through XRF analysis. The vast majority of specimens were assigned to Napa Valley, followed by Bodie Hills, Annadel, Borax Lake and Casa Diablo sources. The visual source assignments were tested by submitting representative examples for XRF analysis. In all cases, the XRF results were consistent with the visual source assignments. Because there is a tendency to conservatively assign specimens to the less common sources (i.e., Bodie Hills, Annadel, Borax Lake, and Casa Diablo), it is probable that these sources are slightly underrepresented and that Napa Valley is slightly over-represented.

TABLE IV.28
OBSIDIAN SOURCING RESULTS BY SOURCE AND METHOD OF DETERMINATION

Source	XRF	Visual	Total
Annadel	4	21	25
Bodie H.	16	109	125
Borax L.	2	9	11
Casa D.	1	1	2
Napa V.	61	1,026	1,087
Unknown	-	8	8
Total	84	1,174	1,258

Obsidian Hydration Studies

A total of 291 obsidian specimens from six sites were subject to obsidian-hydration analysis. The samples were processed by Thomas M. Origer of the Obsidian Hydration Laboratory, Anthropological Studies Center, Sonoma State University (Appendix F). All obsidian samples sourced through XRF (n=84, 29%) were subject to hydration analysis, as well as 207 (71%) of the visually sourced obsidian specimens. Of the 291 specimens submitted for hydration analysis, 265 had a single measurable hydration band. Eight samples had double hydration bands and 18 (6.8%) specimens had irregular bands or no visible hydration bands. Table IV.29 provides a summary of obsidian-hydration samples by site, source, method of source assignment, and type and number of irregular hydration bands. Specimens with a weathered surface, diffuse hydration band, no visible band, or a variable width band were not included further in the analysis. In the case of specimens with double hydration bands, only the first band has been used unless otherwise noted. In addition, one specimen with a hydration band of 10.4 microns and one with a band of 7.0 microns, recovered from the Vaqueros paleosol at CCO-696, were also eliminated. These hydration bands were excessively thick (i.e., old) for their geological context and probably measured a natural break or use unrelated to the site occupation.

TABLE IV.29
OBSIDIAN STUDIES RESULTS BY SITE, SOURCE, AND TYPE OF IRREGULAR BAND

Site	Total	Source	XRF	Visual	NVB	W	DH	VW	DB	Band 1*	Band 2*
CCO-458	75	Bodie H.	-	7	-	-	1		-	-	-
		Borax L.	-	1	-	-	-	1	-	-	-
		Casa D.	-	1	-	-	-	-	-	-	-
		Napa V.	-	66	2	-	-	-	1	2.0	4.4
		Total	0	75	2	0	1	1	1		
CCO-459	11	Napa V.	-	11	-	-	1	-	-	-	-
		Total	0	11	0	0	1	0	0		
CCO-468	4	Napa V.	-	4	-	-	-	-	-	-	-
		Total	0	4	0	0	0	0	0		
CCO-636	8	Bodie H.	-	1	-	-	-	-	-	-	-
		Napa V.	-	7	-	-	-	-	-	-	-
		Total	0	8	0	0	0	0	0		
CCO-637	64	Annadel	1	1	1	-	-	-	-	-	-
		Bodie H.	6	4	-	-	-	-	2	1.9, 2.9	2.2, 5.9
		Casa D.	1	-	-	-	-	-	-	-	-
		Napa V.	25	26	-	8.1	2	1	2	1.3, 2.4	2.4, 4.7
		Total	33	31	1	1	2	1	4		
CCO-696	129	Annadel	3	3	-	-	-	-	-	-	-
		Bodie H.	10	10	-	0.8	1	-	2	2.0, 2.8	4.1, 4.9
		Borax L.	2	4	-	-	1	-	-	-	-
		Napa V.	36	61	2	8.4	1	1	1	2.9	3.4
		Total	51	78	2	2	3	1	3		

Site	Total	Source	XRF	Visual	NVB	W*	DH	VW	DB
All	291	Annadel	4	4	-	-	-	-	-
		Bodie H.	16	22	-	1	2	-	4
		Borax L.	2	5	-	-	1	1	-
		Casa D.	1	1	-	-	-	-	-
		Napa V.	61	175	5	2	4	2	4
		Total	84	207	5	3	7	3	8

*hydration rim values in microns

Recent empirical studies have demonstrated that different obsidian sources hydrate at differing rates (Origer 1987; Tremaine 1989, 1991, 1993). Based on induced hydration experiments, Tremaine has determined that Napa Valley, Bodie Hills, and Casa Diablo obsidians absorb water at approximately the same rate, while Borax Lake hydrates slightly faster and Annadel hydrates slightly slower. For the purpose of temporal comparison in this study, formulae developed by Tremaine (1989, 1993) have been used to convert Annadel and Borax Lake rim values to the Napa Valley hydration rate (i.e., Borax Lake x 0.79 = Napa Valley; Annadel x 1.3 = Napa Valley).

To provide age estimates, the hydration rate for Napa Valley obsidian developed by Origer (1987) was used: ($T=kx^2$), where k for Napa Valley = 153.4. Temperature has been considered an important variable affecting the hydration process (Friedman 1976; Friedman and Smith 1960). Because the hydration rate used here was developed in Santa Rosa, it has sometimes been necessary to

adjust for local temperature differences before applying the conversion formula (e.g., Bouey, ed. 1995:116). Other researchers (Bieling 1996:125; Waechter et al. 1995:37-18), however, have found only slight differences in the effective hydration temperature between the Los Vaqueros vicinity (i.e., Livermore and Antioch) and Santa Rosa, making it unnecessary in this case to adjust the hydration results.

Organization

The discussion below considers the results of the Los Vaqueros obsidian studies by artifact category, by chronostratigraphic unit, and with reference to general site patterns. Also considered is obsidian-source frequency and variability over time. Interpretation of the results is considered in the discussion in Part V.

TEMPORAL PATTERNS

Obsidian-hydration analysis was conducted on specimens from each of the five obsidian sources recovered. Specimens included a sample of Large and Small projectile points, bifaces, and debitage. In order to make intra- and intersite comparisons, hydration samples were obtained from a variety of contexts, including area exposure and vertical units, burial and feature matrices, and surface collections.

Projectile Points

In many parts of California projectile-point typologies are well established, forming a primary source of chronological information. In the San Francisco Bay and Central Valley–Delta regions, however, local typologies and chronological relationships are poorly developed. This is particularly true of Archaic-period projectile points from interior Contra Costa and Alameda counties, where the general dearth of early point types—combined with the morphological variability expressed by the few known specimens—has restricted their utility as discrete temporal markers.

The Large projectile points collected during the Los Vaqueros prehistoric investigations are no exception. The collection includes 16 specimens (obsidian and other materials) divided into seven different morphological types, the majority of which are represented by one or two artifacts. Only the side-notched category (n = 7) has more than 2 specimens.

All of the Large obsidian points were submitted for hydration analysis. These included 8 points from five morphological types: 3 side notch, 2 shouldered lanceolates, 1 concave base, 1 leaf shaped, and 1 wide stem. Only two obsidian sources were represented in the assemblage (Annadel and Napa Valley). A summary of Large projectile points by type, source, and mean hydration is provided in Table IV.30. No hydration band was visible on a leaf-shaped point of Annadel from CCO-637.

Although the sample is small, the hydration results indicate that the oldest point type is the wide stem (7300 B.P.), followed by the concave base (2840 B.P), side notched (3100 to 390 B.P.) and shouldered lanceolate (1040 to 220 B.P.). While the Napa Valley points ranged from 6.9 to 2.6 microns (7300 to 1040 B.P.), the Annadel specimens averaged considerably younger, with rim values of 1.2 and 1.6 microns (395 to 220 B.P.). Even within the side-notched type, the single Annadel specimen was clearly younger than the Napa Valley specimens.

In contrast to the morphological variability of the Large projectile points, the vast majority of Small projectile points recovered from the Los Vaqueros sites were readily assignable to the Stockton series. This point type is relatively common in the region and has long been attributed to the Late Prehistoric (Emergent) period. The Stockton series, however, encompasses a variety of related forms, for which the actual temporal and spatial parameters have not been well defined (Bouey, ed. 1995:91; Fredrickson and Origer 1995:1). Recently, Fredrickson and Origer (1995) studied the temporal–morphological variability of similar serrated points from Sonoma County. Their analysis indicated that stemmed points with multiple serrations were older than side- and corner-notched points with few serrations.

As both stemmed and side-notched subtypes are represented in the Los Vaqueros collection, a sample of each type was selected for hydration analysis. Of the two other small projectile-point types from Los Vaqueros (i.e., Desert Side Notched [DSN] and Panoche Side Notched), only two specimens were obsidian; one was classified as a DSN and the other was only tentatively assigned to the DSN group.

A total of 17 small projectile points were submitted for hydration analysis, including 39% of the Stockton Stemmed points (n = 7), 14% of the Stockton Side Notched points (n = 8), and the 2 DSN points. Three obsidian sources were represented in the Stockton series assemblage, including 14 Napa Valley, 2 Bodie Hills, and 1 Borax Lake specimen; the 2 DSNs were made of Napa Valley obsidian. Table IV.30 provides a summary of small projectile points by type, source, and mean hydration. A variable width band and no visible band were recorded for 2 Stockton series points, including 1 Napa Valley and 1 Borax Lake specimen.

Given the small sample size, the hydration results provide only tentative evidence that the Stockton Stemmed points are older than the Stockton Side Notched points. The mean of the readings for the 2 DSNs falls between the mean of the Stockton subtypes. Converted to years before present, the stemmed points ranged from 920 to 186 B.P., while the side-notched points ranged from 553 to 150 B.P. A difference in the obsidian source frequency between the Stockton subtypes was also identified: Napa Valley made up 94% of the total side- and corner-notched points, but only 72% of the total stemmed points.

In total, 22 usable readings were obtained from the Large and Small projectile points. Because Large points have traditionally been associated with the Archaic period and the small points with the Emergent period, we expected little temporal overlap between these types. Half of the rim values obtained from the Large projectile points, however, are coeval with those obtained from the small projectile points. In addition to the thin rim values obtained from the Large points made of Annadel obsidian (described above), a side-notched point and a shouldered lanceolate point—both of Napa Valley obsidian—overlap in time with the Stockton Stemmed points. These results suggest that either the different projectile-point types were used over a much longer period of time than generally accepted, or that the hydration results are not representative of the actual age of the artifacts.

TABLE IV.30
PROJECTILE POINTS BY TYPE, SOURCE, AND MEAN HYDRATION

Large Projectile Points	NV			AN*		
	mean	range	n	mean	range	n
Shouldered Lanceolate	2.6	-	1	1.2	-	1
Side Notched	3.8	4.5-3.0	3	1.6	-	1
Concave Base	4.3	-	1	-	-	-
Wide Stem	6.9	-	1	-	-	-
Small Projectile Points	NV			BH		
	mean	range	n	mean	range	n
Stockton Side Notched	1.5	1.9-1.0	8	-	-	-
Desert Side Notched	1.9	2.0-1.7	2	-	-	-
Stockton Stemmed	2.1	3.0-1.1	4	2.4	2.9-1.8	2

*converted to Napa hydration rate

Obsidian Bifaces and Debitage

In addition to the 24 readings from projectile points, 39 bifaces and 220 pieces of obsidian debitage produced usable hydration values. Although these samples were recovered from stratigraphic contexts ranging from Early to Late Holocene in age (ca. 10,000 to 250 cal. B.P.), virtually all of the hydration results postdate approximately 4000 B.P.

Hydration readings from Napa Valley bifaces ranged from 4.8 to 1.1 microns (3530 to 190 B.P.), with limited clustering from 2.4 to 3.5 microns (1880 to 880 B.P.). Comparably, Napa Valley debitage ranged from 5.2 microns to 1.0 micron (4150 to 150 B.P.), with a modal peak at 2.4-2.5 microns. Compared to the Napa Valley projectile points, the bifaces and debitage averaged older than the Small points, but considerably younger than the Large points.

Bodie Hills obsidian has a temporal distribution similar to that of Napa Valley. The Bodie Hills bifaces produced hydration measurements ranging from 4.3 to 1.8 microns (2840 to 500 B.P.), with a single outlier at 1.2 microns (220 B.P.). Two primary clusters were identified in the biface measurements; one from 2.2 to 1.8 microns (740 to 500 B.P) and the other from 4.3 to 3.0 microns (2840 to 1380 B.P.). Bodie Hills debitage had a narrower distribution: with the exception of two outliers at 5.1 and 4.9 microns (3990 and 3680 B.P.), the primary cluster of hydration values ranged from 3.6 to 1.9 microns (1980 to 550 B.P.).

The other three obsidian sources had more restricted periods of use. Hydration measurements from Annadel bifaces and debitage were tightly clustered between 1.2 and 1.6 microns (400 to 220 B.P.); a range comparable to that obtained for the large Annadel projectile points. Two Casa Diablo flakes had mean rim values of 3.7 and 2.6 microns (2100 to 1036 B.P.) and 5 Borax Lake flakes ranged from 3.4 to 2.5 microns (1780 to 1000 B.P.).

Hydration by Chronostratigraphic Unit

While there is a good fit between the cultural radiocarbon dates and the chronostratigraphy in the project area, the hydration results are problematic. At several sites/loci the range of hydration values was found to be older or younger than the chronostratigraphic unit in which the archaeological deposit was contained (Figure IV.15).

The most obvious inconsistency comes from the oldest component at CCO-696 (CCO-696D), associated with the Kellogg paleosol. Although several radiocarbon dates indicate that the buried soil dates between 10,000 and 6600 cal. B.P., hydration results on Napa Valley obsidian from the Kellogg unit range between 6.9 and 1.3 microns, with 9 out of 10 samples falling between 2.6 and 1.3 microns (1040 to 260 B.P.). Samples of Bodie Hills and Annadel obsidians from that context produced similarly recent readings. Only one specimen, a wide-stem projectile point, yielded a mean rim value (6.9 microns, or 7303 B.P.) consistent with the radiocarbon dates. At CCO-458, associated with the Brentwood alluvium, the mean value is older than the maximum age of the soil unit. Napa Valley obsidian specimens from Unit I at CCO-637 and the Vaqueros paleosol in CCO-696 South produced several hydration values younger than the maximum age of their capping units (<650 B.P.). The maximum and mean rim values from these sites, however, are within the expected time range of the soil units. Hydration results from the other sites and/or loci are more consistent with the estimated age of the geological deposits, although outlying rim values were also identified.

When considering only the projectile-point hydration values, a general correlation between the age of the soil unit and the mean hydration age can be seen, although there were several discrepancies. The Napa Valley specimens are the most consistent, and the mean hydration ages fit well with the estimated age of the soil units; only the shouldered lanceolate from the Kellogg paleosol did not fit the sequence. Based on their stratigraphic associations, the two large Annadel points were younger than expected, while the mean of the Bodie Hills Stockton Stemmed points was older than expected. Since these stemmed points were recovered from both the Kellogg and Brentwood units, the older rim values are acceptable on a temporal basis. On a stratigraphic basis, however, the points that produced the older rim values were recovered from the Brentwood alluvium, the reverse of the expected association.

While the inconsistencies between the chronostratigraphy and hydration results are somewhat enigmatic, in most cases the apparent stratigraphic reversals appear to be byproducts of mixing between the Vaqueros and Brentwood units or chronostratigraphic equivalents at CCO-637. In the case of the Kellogg paleosol, however, physical evidence for stratigraphic mixing with the Vaqueros unit was lacking, suggesting that more fundamental problems with the hydration process may be involved.

Hydration Results by Site

The temporal distribution of Napa Valley obsidian-hydration values indicates that CCO-696 and -637 have the longest records of obsidian use, followed by CCO-458, -636, -459, and -468 (Figure IV.15). When compared to the radiocarbon dates and other temporal indicators from each site (e.g., shell beads and projectile points), the hydration results provide a somewhat different chronology of site occupations. For example, based on the distribution of Napa Valley hydration values, CCO-458 appears to have been used earlier and for a longer period of time than indicated through other lines of evidence. Additionally, although CCO-637 produced radiocarbon dates that were primarily older than those from CCO-696 South, the ranges of hydration values from each site were essentially equivalent.

Interestingly, regardless of the context, there was little variation in the mean hydration values of the different obsidian sources. With the exception of CCO-468, the mean Napa Valley rim value from each of the other sites/loci varied less than one micron (2.9 to 2.1 microns). The same is true of the mean rim values obtained from the Bodie Hills and Annadel specimens.

Comparison of the mean Napa Valley hydration date with the mean radiocarbon date at each site indicates a good correspondence between the mean ages at the four youngest sites/loci (e.g., CCO-468, -458, -696N, -459). There are significant differences, however, between the mean ages from each of the older sites/loci (e.g., CCO-636, -637, -696S, -696D). The older the mean radiocarbon age, the wider the temporal gap between it and the mean obsidian-hydration value. Even at sites where hydration samples are relatively large (e.g., CCO-637, -696 South), the mean obsidian age is considerably younger than the mean radiocarbon age. For example, at CCO-696 South, where 7 radiocarbon dates and over 70 Napa Valley hydration values were obtained, both the mean and minimum rim values are younger than the youngest radiocarbon date. The same is true of the hydration results from CCO-636, -637, and the Lower Archaic component at CCO-696 (696D), discussed above.

Setting aside the problematic results from the deep component at CCO-696, the lack of correspondence between the obsidian dates and the radiocarbon dates from the older sites appears to be related to changes in the frequency of obsidian use through time. Given the long-term availability of the Vaqueros paleosol and chronostratigraphic equivalents, the poor correspondence between the obsidian and cultural radiocarbon dates from these contexts may, in part, be related to an increased use of obsidian over time, a proposition supported by the regional record.

SOURCE VARIABILITY

Obsidian Frequency and Source Variability Over Time

Researchers working in central California have found significant variations in the use of obsidian over time. Studying several components from interior Contra Costa County, Fredrickson (1969) found that from approximately 4000 to 1000 B.P., obsidian made up a very small fraction of the total flaked-stone assemblage. In components postdating 1000 B.P., however, the frequency of obsidian increased dramatically (Fredrickson 1969:119; dates based on Ericson 1977:322-323). A similar pattern of expanded Late-period obsidian use has been identified in the Central Valley–Delta region (Jackson 1974:79) and Livermore Valley (Bieling 1996:142). In examining obsidian-source variability over time, Jackson (1974:79) found that Early and Middle period (ca. 4000 to 1000 B.P.) assemblages from the Central Valley–Delta contained high frequencies of eastern Sierra obsidian, primarily Bodie Hills and Casa Diablo. In Late-period assemblages, however, Napa Valley obsidian occurred almost exclusively (Bouey and Basgall 1984:139; Jackson 1974:68). In the Bay Area, where Napa Valley was dominant throughout the known span of prehistory, a parallel decline in the use of Eastern Sierra

obsidian was also identified (Banks and Orlins 1979, 1980; Bouey and Basgall 1984:139; Jackson 1974:70).

The overall distribution of hydration values obtained for the Los Vaqueros Project agrees well with the regional findings. Figure IV.16 depicts the frequency of obsidian-hydration values over time. The peak in obsidian use appears to occur at approximately 950 B.P., roughly corresponding to the Archaic/Emergent transition. The histogram also indicates that over time, use of Napa Valley obsidian increased relative to Bodie Hills obsidian. Both Borax Lake and Annadel obsidians appear to have been used primarily during the Archaic/Emergent transition and the Emergent periods.

Obsidian Frequency by Site

To compare the relative frequency of obsidian between time periods at Los Vaqueros sites, following Fredrickson (1969:119), a proportional flaked-stone index was calculated. The index was designed to monitor changes in the use of cryptocrystalline stone (CCS) relative to obsidian over time. Assemblages from the six sites, ranging in age from ca. 5700 to 250 B.P., were examined. Due to differences in recovery methods, flaked stone from the Early Archaic component at CCO-696D was not considered. The index was calculated by dividing the total number of CCS pieces by the combined total of CCS and obsidian (Fredrickson 1969:119). Results from the Los Vaqueros sites (Table IV.31) are consistent with the regional findings.

TABLE IV.31
PROPORTIONAL CRYPTOCRYSTALLINE–OBSIDIAN INDEX

Site	Period	Obsidian (n)	CCS ( )n	C/O Index
CCO-468	Upper Emergent	12	-	0.00
CCO-458	Lower Emergent	3,318	646	0.16
CCO-459	Archaic/Emergent	20	32	0.62
CCO-636	Archaic/Emergent	9	14	0.61
CCO-696*	Upper Archaic	339	1,139	0.77
CCO-637	Middle Archaic	61	262	0.81

*Does not include debitage from the North Locus or Kellogg paleosol

The results indicate that, over time, obsidian use increased relative to CCS. In accord with the regional pattern, the highest proportion of obsidian occurred during the Emergent period. In contrast to Fredrickson's (1969:Table 7) data, however, the Los Vaqueros assemblage appears to have included a much higher frequency of obsidian during all time periods. Although the dissimilar results may simply be a product of differential access to obsidian between the two regions, it appears that the higher frequency of obsidian in the earlier assemblages from Los Vaqueros, is partly a product of the long-term availability of the landforms. That is, although occupations at sites CCO-637 and CCO-696 South were radiocarbon-dated to the Middle and Upper Archaic periods, respectively, these deposits remained exposed at the surface for at least a thousand years before they were buried. This situation may have permitted obsidian associated with later time periods to be incorporated into the earlier assemblages. This scenario explains, in part, why the obsidian-hydration values from both sites are—on the average—younger than the radiocarbon dates.

Obsidian Source Variability Over Time

Napa Valley obsidian was the most frequently represented obsidian source at all sites and during all time periods at Los Vaqueros. Bodie Hills was the second most frequently represented source, followed by Annadel, Borax Lake, and Casa Diablo obsidian. Hydration results from the Los Vaqueros investigations correspond well with the temporal changes in obsidian-source frequencies identified in the regional record. In the Los Vaqueros sample, as the total frequency of obsidian increased, the proportion of Napa Valley relative to Bodie Hills increased significantly (Figure IV.16). Consistent with these results, the mean rim value for the total Bodie Hills sample is larger than the mean for the total Napa Valley sample, indicating that Bodie Hills was better represented earlier in time. Similarly, the highest frequency of eastern obsidians (i.e., Bodie Hills and Casa Diablo) occurs at sites with the longest records of obsidian use (e.g., CCO-696 South, -637, -458). This trend also corresponds with the source variability found in the Stockton series points. That is, the oldest Stockton subtype—the Stockton Stemmed point, had the highest frequency of Bodie Hills obsidian.

Changes in the proportion of eastern Sierra versus North Coast Ranges obsidian debitage during the Archaic through Emergent periods are expressed in a site-by-site comparison. Eastern source obsidians make up approximately 18% of the total obsidian debitage from Middle and Upper Archaic-period sites CCO-637 and CCO-696 South, and approximately 5% of the debitage from the predominantly Emergent-period site CCO-458. No eastern obsidian was identified in the other three Emergent-period assemblages. This distribution coincides with the chronostratigraphy from the project area. That is, the highest frequency of eastern source obsidian was associated with the Middle to Late Holocene Vaqueros paleosol or its chronostratigraphic equivalent at CCO-637. Although the hydration results were inconclusive regarding association, the obsidian debitage recovered from the Kellogg paleosol at CCO-696D was from North Coast Ranges sources (10 Napa Valley, 1 Annadel). A Bodie Hills biface tip, however, was also recovered from the paleosol, possibly indicating access to both North Coast Ranges and eastern Sierra sources as early as 6600 B.P.

Obsidian Acquisition and Discard

Along with the temporal changes in obsidian use and source variability recognized in the regional record, researchers have also identified changes in the form of acquisition. While obsidian from earlier time periods was probably obtained as complete or near-complete artifacts from both the North Coast Ranges and eastern Sierra sources (Bouey and Basgall 1984:139; Fredrickson 1973; Jackson 1974:79), the higher frequency of obsidian during the late prehistoric period was associated with the importation of relatively unmodified obsidian from the Napa Valley source, including cobbles and large cortical, flake blanks (Jackson 1974:79; Bramlette 1989:118; Bieling 1996:135).

As a primary measure of changes in the mode of obsidian acquisition in the Los Vaqueros Project area, an analysis of the technological attributes of recovered obsidian debitage was conducted. All samples sourced through visual or XRF methods were incorporated into the analysis. Debitage was segregated into four categories based on overall morphology:

1. flakes retaining patches of the original cortical surface—considered to be indicative of cobble or early-stage reduction;
2. flakes with bifacial platforms, planar curvature, and/or complex dorsal surfaces—considered to represent biface thinning and/or tool rejuvenation;
3. interior flakes with simple dorsal surfaces with or without planar curvature—considered to be associated with either primary reduction or biface thinning; and
4. bipolar flakes displaying bidirectional flake scars, pronounced percussion rings, sheared faces, and or crushed margins—considered to result from the primary reduction of small cobbles and/or the recycling of artifacts.

Based on the regional pattern, it was expected that the Emergent-period sites would have a higher proportion of debitage associated with primary reduction and that the Archaic-period sites would have a higher proportion of debitage associated with biface thinning and tool rejuvenation.

Table IV.32 provides the results of the study. Consistent with expectations, cortical flakes of Napa Valley obsidian occur in the highest frequencies at the Emergent-period sites—CCO-458, -459, and -468—while the highest frequencies of biface-thinning flakes occur in the earlier deposits at CCO-636, -637, and -696. Interior flakes are most frequently represented at sites CCO-458 and -468, followed by the Upper Archaic site CCO-696. Bipolar flakes, which occur in low frequencies at CCO-458, -637, and -696, are twice as common at CCO-459. Agreeing with these results, a large cortical flake blank of Napa Valley obsidian recovered from CCO-458 and an unmodified obsidian cobble collected from the Brentwood alluvium at CCO-696, are probably characteristic of the form in which Napa Valley obsidian was obtained during the Emergent period. Also in agreement with the debitage analysis, hydration values obtained from Napa Valley and Bodie Hills bifaces and large projectile points indicate that these artifacts date primarily to the Upper and Middle Archaic periods.

TABLE IV.32
OBSIDIAN DEBITAGE BY SITE, SOURCE, AND FLAKE TYPE

Site	Source	Cortical %	Interior %	Biface %	Bipolar %	Total N
CCO-696S	Napa	3.0	33.7	62.9	0.5	252
	Bodie H.	-	34.9	65.1	-	59
	Borax L.	-	-	100.0	-	5
	Annadel	-	-	100.0	-	
CCO-637	Napa	2.2	8.7	87.0	2.2	49
	Bodie H.	-	10.0	70.0	20.0	10
	Annadel	-	100.0	-	-	1
CCO-636	Napa	-	-	100.0	-	8
CCO-459	Napa	5.3	10.5	73.7	10.5	20
CCO-458	Napa	29.0	51.0	19.3	0.7	426
	Bodie H.	-	57.1	42.8	-	24
	Borax L.	-	100.0	-	-	1
	Annadel	-	100.0	-	-	3

DISCUSSION

Attempts to correlate the obsidian-hydration results with radiocarbon dates from specific contexts, soil units, and site occupations have produced mixed results. Most notable is the lack of correspondence between the obsidian and radiocarbon dates from the deep component at CCO-696. In the absence of direct evidence for stratigraphic mixing, we assume that the obsidian recovered from the early Holocene paleosol is a valid association. It appears that the hydration process may have been affected by a variety of factors related to the age, depth of burial, and context of the obsidian.

Setting aside the problems from the deep component at CCO-696, most of the apparent contradictions between the obsidian and radiocarbon evidence can be interpreted with reference to the geological context of the assemblages. The majority of sampled archaeological contexts were associated with soil units dating between the mid- and late Holocene. In most places the vertical separation between these soil units was not very profound, ranging from 0.5 to 1 meter, as compared to

the 2 meters of sediment that separated the early and mid-Holocene soils from each other. The close physical relationship between the mid- and late-Holocene soils suggests that stratigraphic reversals between the soil units are likely to be a byproduct of biological and/or mechanical turbation processes and events. Evidence for such stratigraphic mixing was identified at every one of the mid- to late-Holocene archaeological deposits.

In addition, the poor correspondence between the cultural radiocarbon dates and obsidian-hydration values from individual sites and from specific contexts is probably related to the long-term stability of the associated landforms. The temporal continuity of the mid-Holocene soils (i.e., Vaqueros paleosol and Unit I, CCO-637) has resulted in the repeated occupation of site locations over thousands of years. This situation has had three primary effects on the reliability of obsidian as a chronological tool at these sites: (1) the long-term exposure and stability of these soils indicates that, in most cases, the archaeological record did not develop a vertical structure—rather archaeological materials spanning thousands of years were superimposed on the same soil surface; (2) near-surface weathering and turbation processes and events apparently moved archaeological materials within the soil units, introducing obsidian into temporally unrelated contexts, such as features and burials; and (3) changing patterns of obsidian acquisition and discard over time have biased the obsidian record toward the latest prehistoric occupations, essentially masking the evidence of earlier site activity, which involved minimal use of obsidian.

SUMMARY AND CONCLUSIONS

The thorough chronostratigraphic and radiocarbon chronology produced by the Los Vaqueros investigations provides a number of points of comparison with the obsidian-sourcing and hydration results. Based strictly on the stratigraphic evidence, both obsidian from the North Coast Ranges (i.e., Napa Valley and Annadel) and the eastern Sierra (i.e., Bodie Hills) appears to have been used as early as 6600 B.P.

Contrary to the chronostratigraphy, however, virtually all of the obsidian-hydration values postdate approximately 4000 B.P. Napa Valley obsidian appears to have been the dominant obsidian source during all time periods, while Bodie Hills and rare Casa Diablo obsidians are best represented during the late Middle and Upper Archaic periods. Borax Lake obsidian was dated primarily to the Archaic/Emergent transition. Annadel obsidian provided the least reliable hydration results, with numerous contradictions between the stratigraphic context, artifact form, and associated hydration values. Samples of Annadel obsidian recovered from early through late-Holocene contexts, and in the form of bifaces, flakes, and large projectile points, all produced Emergent-period rim values, each within 0.5 micron of one another (1.2 to 1.6 microns).

Consistent with regional findings, patterns of obsidian use and discard at Los Vaqueros appear to have changed significantly between the Upper Archaic and Emergent periods. During the Archaic period, obsidian appears to have been relatively rare, imported from the North Coast Ranges and eastern Sierra, primarily in the form of finished artifacts. During the Emergent period, however, obsidian use increased, associated with the importation of obsidian cobbles and minimally modified flake blanks, exclusively from the Napa Valley source.

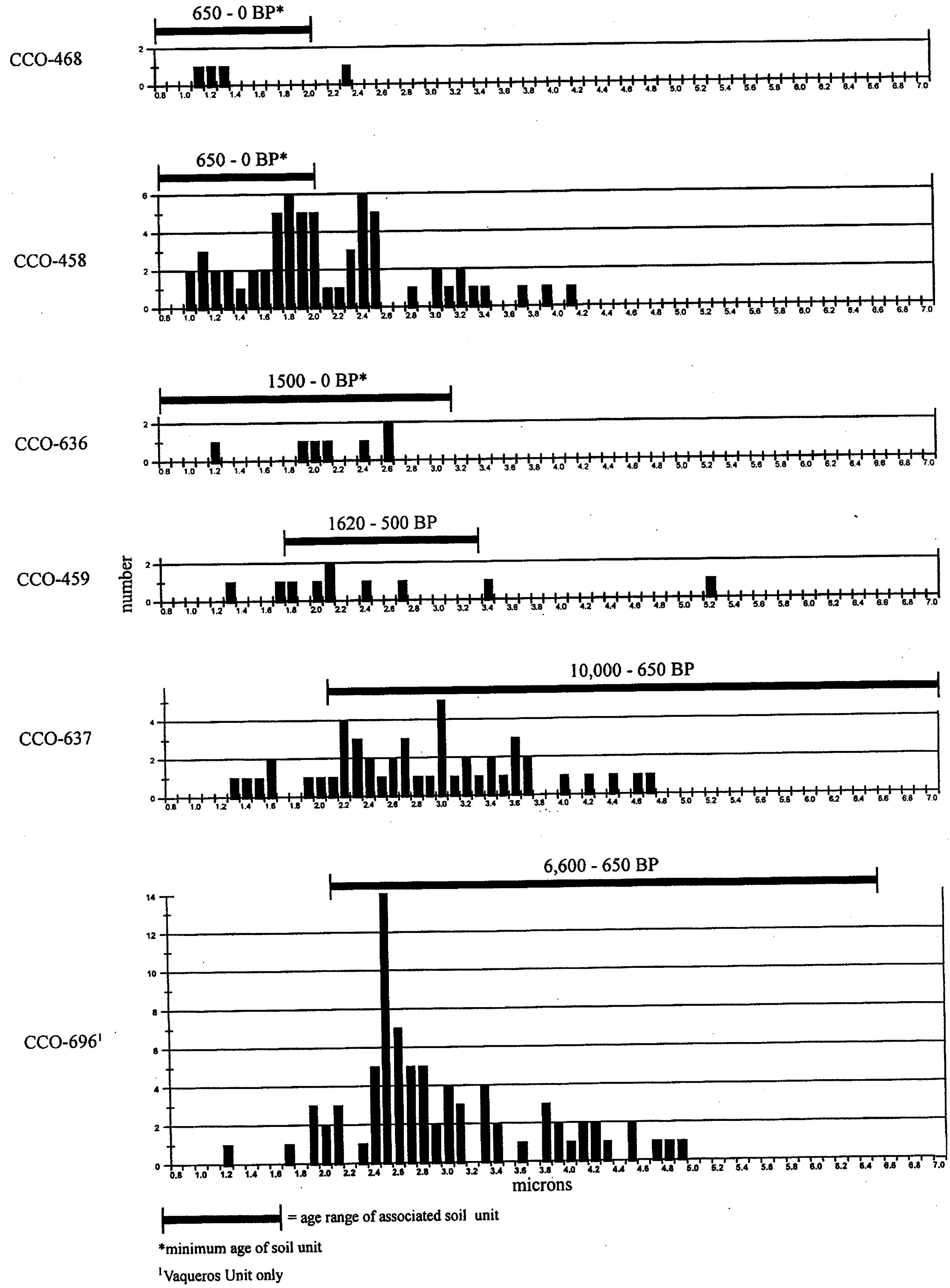


Figure IV. 15. Mean Obsidian-Hydration Readings and Minimum Age of Soil Unit by Site

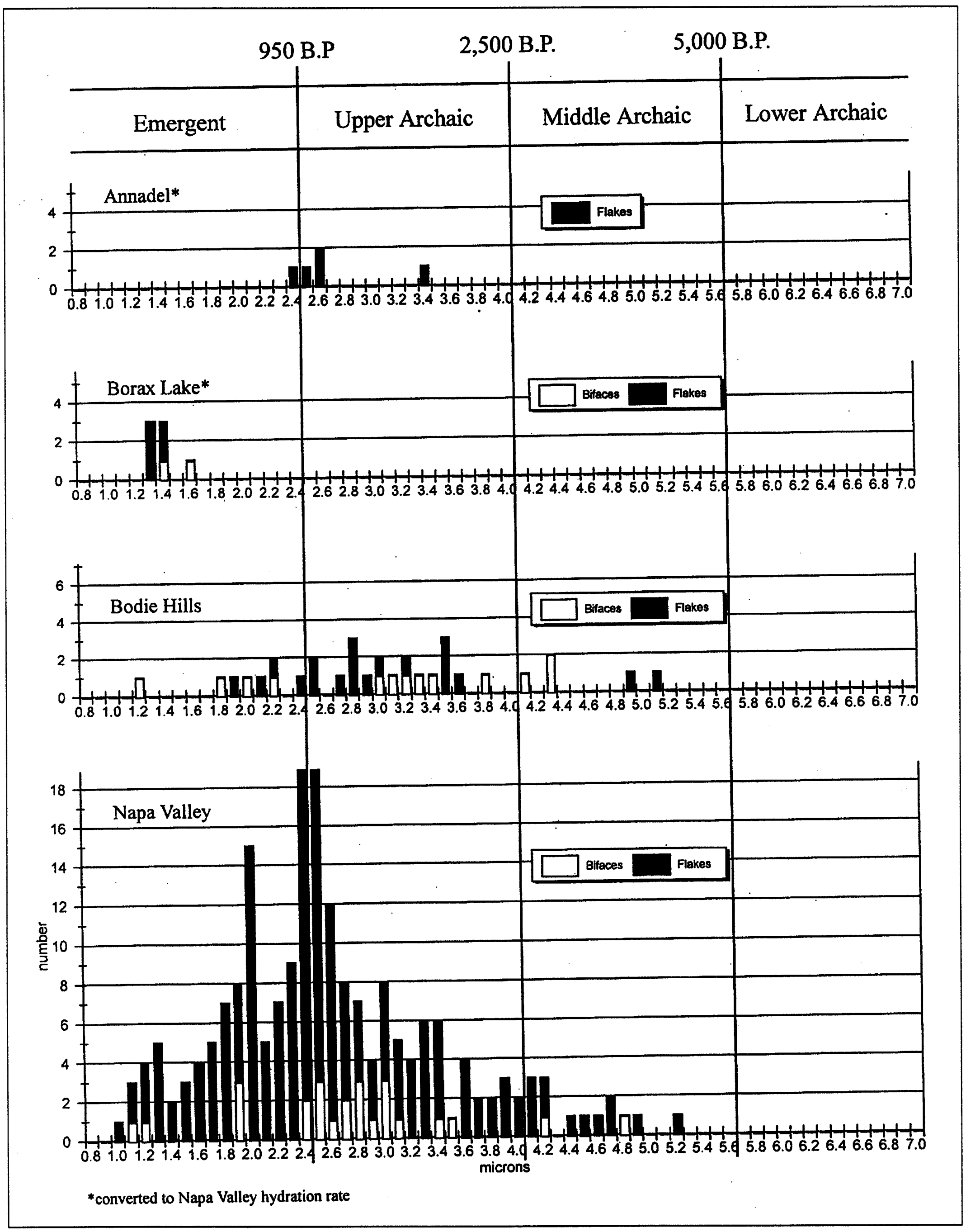


Figure IV.16. Frequencies of Hydration Values for Los Vaqueros Specimens of Annadel, Borax Lake, Bodie Hills, and Napa Valley Obsidian

CHAPTER 9
MORTUARY PRACTICES AND HUMAN OSTEOLOGY

INTRODUCTION

A total of 198 human burials were excavated from three sites (CA-CCO-458, -637, -696) in the Los Vaqueros Project area; two other sites (CA-CCO-459 and -631) contained unassociated human skeletal remains representing a minimum of 8 individuals. Table IV.33 and the discussion below summarize some of the more important findings regarding mortuary practices and differential osteological patterns over time. Appendix D details field and laboratory methods and reporting procedures. In addition, the appendix provides a site-by-site description of each burial, including an illustration; information on provenience; age and sex determinations; artifact associations; and descriptions of pathologies and other nonmetric traits.

More detailed osteological information, skeletal inventories, and osteometric measurements are contained in separate volumes accessioned with the collection and also housed in the Archaeological Research Library, Anthropological Studies Center, Sonoma State University. Due to the nature and context of the discovery of skeletal remains identified at CCO-631 (see Site Reports), those burials are not considered below.

ANALYTICAL POPULATION

In order to evaluate differential mortuary practices and potential osteometric and health status differences for burials within and between time periods, the population was divided into five chronological groups (the Early Archaic, Middle Archaic, Upper Archaic, Upper Archaic/Emergent, and Emergent periods). Temporal assignments, as defined in the Site Reports chapter, were based on chronostratigraphy, radiocarbon dates, and temporally diagnostic shell-bead types. As a result of the chronological divisions, analytical groups crosscut site/locus designations as follows:

Lower Archaic	CCO-696: Burial 160
Middle Archaic	CCO-696: Burials 86, 155, 158
	CCO-637: Burials 1-18
Upper Archaic	CCO-696: Burials 2-7, 12-66, 68-85, 87-95, 97-109, 112-137, 139-140, 143, 145-154
Archaic/Emergent	CCO-696: Burials 1, 8-11, 67, 96, 110, 111, 138, 141, 142, 144
Emergent	CCO-458: Burials 1-3
	CCO-459: Burial 1
	CCO-696: Burials 156, 157, 159

MORTUARY PRACTICES

The study of mortuary practices considered several primary data sets summarized below, including mode of interment (e.g., individual or multiple burial, primary or secondary inhumation, or cremation), placement of the body (e.g., position, orientation, and location within the site), burial accompaniments (e.g., type and number of artifacts, burial markers, or pigment), and demographic variables (e.g., differences in treatment by age and sex).

TABLE IV.33
HUMAN REMAINS FROM LOS VAQUEROS PROJECT SITES BY TIME PERIOD

Emergent Period

Site	Burial	Sub	Age Min.	Age Max.	Age Class	Sex*	Position	Side	Orientation	Depth BD	Datum	Depth BS	Pathology**	Non-metrics	Assoc.
696	156		22	26	adult	M	tight flex	dorsal	108	107	M5	-	yes (c,d,e,h,pc)	yes	no
696	157		23	26	adult	-	cremation	-	-	133	M5	-	no	no	shell beads; pestle; projectile point; C14: 690 cal B.P.
696	159		22	26	adult	M	tight flex	left	306	147	M5	-	yes (d)	yes	projectile point
458	1		18	+	adult	F	cremation	-	-	60	Grid	-	no	no	C14: 465 cal B.P.
458	2		26	+	adult	F-	-	-	-	66	Grid	-	no	no	no
458	3		0	0.25	infant	-	-	-	-	60	Grid	-	no	yes	no
459	1		0	0.5	infant	-	-	-	-	-	-	-	no	no	no

Upper Archaic/Emergent Period

Site	Burial	Sub	Age Min.	Age Max.	Age Class	Sex*	Position	Side	Orientation	Depth BD	Datum	Depth BS	Pathology**	Non-metrics	Assoc.
696	1		35	+	adult	F+	extended	ventral	342	70	A	62	yes (a,d,h,s)	yes	no
696	8		18	+	adult	M	extended	ventral	21	75	A	75	yes (e,h,o)	yes	no
696	9		10	13	juvenile	-	extended	ventral	340	136	A	68	yes (a)	yes	no
696	10		44	50	adult	F	extended	ventral	332	147	A	79	yes (a,d,o)	yes	no
696	11		20	25	adult	F	extended	ventral	2	81	A	81	yes (a,h,t)	yes	no
696	67		26	35	adult	M	semi-extended	dorsal	194	85	A	56	no	yes	no
696	96		30	35	adult	F	extended	ventral	290	123	A	65	yes (h)	yes	no
696	110		24	27	adult	F	semi-extended	ventral	305	27	A	60	yes (c,d,h,pc)	yes	no
696	111		18	+	adult	M	semi-extended	dorsal	324	97	A	79	yes (o,pc)	no	no
696	138		42	47	adult	F+	extended	ventral	20	22	A	75	yes (d,o,pc)	yes	no
696	141		19	20	adult	F	semi-extended	ventral	322	85	A	87	yes (d,e,h,p)	yes	no
696	142		20	24	adult	M	extended	ventral	328	85	A	87	yes (c,d,m,p)	yes	no
696	144		30	+	adult	F+	extended	ventral	127	60	A	62	yes (d,o)	yes	no

* M = male; M+ = probable male; M - = possible male; F = female; F+ = probable female; F- = possible female

** a = anomaly; c = cranial pathology; d = dental pathology or anomaly; e = enamel extension; h = dental hypoplasia; o = osteophytic growth; p = enamel pearl; pc = postcranial pathology; r = exostosis of the external auditory meatus; s = septal aperture in olecranon fossa, distal humerus; t = supernumerary tooth; m = congenital absence of M3; w = special use-wear on tooth

Site	Burial	Sub	Age Min.	Age Max.	Age Class	Sex*	Position	Side	Orientation	BD	Datum	BS	Pathology**	Non-metrics	Assoc.
696	2		40	+	adult	M+	tight flex	left	257	133	A	125	yes (d,e)	yes	no
696	3		21	26	adult	M	tight flex	dorsal	344	121	A	113	yes (d,e)	yes	no
696	4		30	+	adult	F-	tight flex	right	192	124	A	116	yes (o)	yes	no
696	5		18	+	adult	-	tight flex	right	220	106	A	98	yes (h)	no	no
696	6		26	+	adult	M+	tight flex	dorsal	218	103	A	95	yes (e,h)	yes	no
696	7		35	+	adult	F	tight flex	right	186	115	A	105	yes (d,e,p,o)	yes	C14: 1320 cal B.P.
696	12		18	30	adult	F+	tight flex	left	210	115	A	107	yes (d,e,pc)	yes	no
696	13		26	+	adult	-	loose flex	right	260	102	A	94	yes (a)	no	no
696	14		26	31	adult	F+	loose flex	left	260	93	A	85	yes (p)	yes	shell beads
696	15		21	26	adult	F-	tight flex	left	239	95	A	87	yes (a,d)	yes	no
696	16		25	35	adult	-	-	-	227	113	A	105	yes (d,e)	yes	shell beads
696	17		18	+	adult	M	tight flex	ventral	128	100	A	82	yes (e,h)	yes	no
696	18		18	+	adult	-	loose flex	left	211	110	A	103	yes(d)	yes	shell beads
696	19		12	14	adolescent	-	tight flex	right	218	98	A	88	yes (h)	yes	no
696	20		18	30	adult	F	loose flex	left	272	130	A	120	yes (a,e,h)	yes	no
696	21		18	+	adult	-	-	-	-	130	A	62	no	no	no
696	22		8	12	juvenile	-	tight flex	left	214	95	A	85	yes (d,h)	no	no
696	23		35	40	adult	M+	tight flex	right	222	113	A	116	no	no	shell beads
696	24		18	+	adult	-	-	-	-	111	A	114	no	no	no
696	25		18	+	prob. adult	-	-	-	-	71	A	74	no	no	no
696	26		25	30	adult	F+	semi-extended	right	45	120	A	118	yes (d,e,h,o)	yes	shell beads
696	27		26	30	adult	F+	tight flex	right	224	127	A	125	yes (d,e,h)	yes	shell beads; mortar; pestle; bear tarsal
696	28		35	40	adult	M+	loose flex	left	264	129	A	131	yes (d,o,pc)	yes	no
696	28	A	26	31	adult	-	-	-	-	129	A	131	no	no	no
696	29		27	38	adult	M	-	-	-	55	A	47	yes (c,d,e)	yes	no
696	30		22	26	adult	M	tight flex	left	230	109	A	111	yes (d,e,h,pc)	no	shell beads; quartz crystal; C14: 2345 cal B.P.
696	31		20	25	adult	-	tight flex	right	220	101	A	98	yes (d)	no	shell beads
696	32		25	30	adult	-	tight flex	right	255	112	A	98	yes (w)	no	shell beads
696	33		18	+	adult	-	tight flex	left	245	118	A	115	no	no	shell beads
696	34		9	12	juvenile	-	semi-extended	left	230	114	A	111	yes (d,e)	no	shell beads
696	35		18	21	adult	-	tight flex	left	220	117	A	114	no	no	shell beads; shell ornaments
696	36		18	+	adult	-	tight flex	ventral	210	119	A	116	yes (d,e,h,t)	no	shell beads
696	37		18	25	adult	-	loose flex	right	127	119	A	116	yes (d,e,h)	no	shell beads
696	38		1	1.5	infant	-	-	-	-	107	A	104	no	no	no
696	38	A	8	10	juvenile	-	-	-	-	107	A	104	yes (d)	no	no
696	38	B	10	12	juvenile	-	-	-	-	107	A	104	yes (d)	no	no
696	39		15	17	adolescent	-	tight flex	ventral	210	101	A	98	yes (d,e)	no	no

Upper Archaic Period

Site	Burial	Sub	Age Min.	Age Max.	Age Class	Sex*	Position	Side	Orientation	BD	Datum	BS	Pathology**	Non-metrics	Assoc.
696	40		26	+	adult	-	tight flex	left	80	114	A	110	yes (a,d)	no	shell beads
696	41		35	+	adult	-	-	-	-	114	A	110	yes (d,o,pc)	no	shell beads
696	42		30	+	adult	-	tight flex	ventral	246	103	A	100	yes (d,h,o,w)	no	shell beads
696	43		18	+	adult	-	tight flex	ventral	240	107	A	104	yes (a,d)	no	shell beads
696	44		25	30	adult	-	tight flex	right	218	111	A	98	yes (d,h)	no	no
696	45		18	+	adult	-	tight flex	right	202	115	A	112	yes (d,e,h,o,w)	no	shell beads
696	46		20	+	adult	-	tight flex	right	220	99	A	96	yes (o)	no	shell beads
696	47		22	30	adult	-	tight flex	right	240	102	A	99	yes (d,e,h)	no	no
696	48		20	+	adult	-	tight flex	ventral	212	106	A	103	yes (d,w)	no	shell beads; quartz crystal; C14: 1610 cal B.P.
696	49		22	30	adult	-	tight flex	right	250	98	A	95	yes (d)	no	no
696	50		18	23	adult	F-	tight flex	-	-	98	A	93	no	no	no
696	51		22	30	adult	-	tight flex	ventral	360	97	A	92	yes (d)	yes	no
696	52		30	35	adult	M	tight flex	left	310	106	A	101	yes (a,e,o,pc)	yes	no
696	53		42	+	adult	M	loose flex	left	148	89	A	84	yes (a,d,r)	yes	shell beads
696	54		28	33	adult	M	tight flex	left	230	119	A	116	yes (d)	yes	no
696	55		24	29	adult	-	tight flex	right	230	132	A	129	no	no	shell beads
696	56		18	+	adult	M-	tight flex	right	250	114	A	111	yes (a,d,e,h,o)	yes	shell beads
696	57		17	22	adult	-	tight flex	ventral	225	114	A	111	yes (d,e)	no	shell beads; shell orns; mortar
696	58		35	+	adult	M	tight flex	left	245	122	A	119	yes (d,w)	yes	shell beads
696	59		24	28	adult	M	tight flex	ventral	224	112	A	109	yes (a,d,e,pc,t)	yes	shell beads
696	60		25	35	adult	-	extended	ventral	72	114	A	111	yes (d,e,h)	no	shell beads
696	61		20	24	adult	F+	-	ventral	250	120	A	117	yes (d,e,r)	yes	no
696	62		26	+	adult	-	tight flex	right	218	115	A	117	yes (t)	yes	no
696	63		15	+	prob. adult	-	-	-	-	93	A	123	no	no	no
696	64		30	+	adult	M	loose flex	right	316	96	A	78	yes (o)	yes	no
696	65		26	40	adult	M	tight flex	left	40	97	A	101	yes (d,o)	yes	shell beads; shell ornaments
696	66		4	6	juvenile	-	-	-	-	77	A	91	yes (h)	yes	no
696	68		18	+	adult	-	-	left	-	80	A	62	yes (pc)	no	no
696	69		39	44	adult	F+	tight flex	dorsal	250	118	A	115	yes (h,o)	yes	shell beads
696	70		14	+	prob. adult	-	tight flex	-	-	101	A	98	no	no	shell beads
696	70	A	12	15	adolescent	-	-	-	-	101	A	98	yes (d,e)	no	no
696	71		14	18	adolescent	F-	tight flex	right	220	109	A	106	no	no	shell beads
696	72		30	45	adult	F+	tight flex	right	200	115	A	113	yes (pc)	yes	no
696	73		30	+	adult	-	tight flex	right	320	114	A	111	no	no	shell beads; C14: 2355 cal B.P.
696	75		23	33	adult	F	tight flex	left	220	88	A	85	yes (d,h.pc,r)	yes	no
696	76		26	+	adult	-	tight flex	right	230	114	A	119	yes (d,e,h,pc)	yes	shell beads; pestle
696	77		20	26	adult	-	-	-	-	105	A	100	no	no	no

Upper Archaic Period

696	78		28	40	adult	-	tight flex	right	240	119	A	116	no	yes	shell beads
696	79		6	7	juvenile	-	-	-	-	108	A	105	yes (d,h)	no	no
696	80		22	26	adult	F-	tight flex	left	204	86	A	98	no	yes	no
696	81		20	25	adult	M-	tight flex	right	247	118	A	114	yes (d)	no	shell beads; bone wands
696	82		26	35	adult	M+	tight flex	left	280	118	A	115	yes (d,e,h)	yes	shell beads
696	82	A	12	15	adolescent	-	-	-	-	118	A	115	yes (d,e,h,t)	no	no
696	83		18	+	adult	-	loose flex	left	240	119	A	116	no	no	shell beads; shell ornaments
696	84		25	35	adult	F-	tight flex	dorsal	180	116	A	114	yes (a,d,e)	yes	shell beads
696	85		25	30	adult	-	loose flex	dorsal	240	117	A	115	yes (d,e)	no	shell beads
696	87		4	6	juvenile	-	-	-	-	110	A	107	no	no	shell ornament
696	88		0.5	0.75	infant	-	-	-	-	114	A	111	no	no	shell beads
696	89		25	35	adult	-	tight flex	right	220	101	A	98	yes (d)	no	no
696	90		18	30	adult	M	tight flex	ventral	45	130	A	127	yes (h)	no	shell beads; shell ornaments
696	90	A	18	23	adult	F-	-	-	-	130	A	127	yes (c,d,e,h)	yes	no
696	90	B	18	+	adult	-	-	-	-	130	A	127	no	no	no
696	90	C	8	16	juv/adol	-	-	-	-	130	A	127	no	no	no
696	91		28	35	adult	F+	-	-	238	116	A	113	yes (a)	no	shell beads
696	92		16	20	adolescent	F-	-	-	-	120	A	117	yes (d,e)	yes	no
696	93		20	25	adult	-	-	-	-	128	A	125	yes (d,e)	no	no
696	94		18	+	adult	M-	tight flex	ventral	320	116	A	108	no	yes	no
696	95		18	19	adult	F	tight flex	left	255	121	A	118	no	no	shell beads
696	97		2	6	infant/juv	-	-	-	-	117	A	99	no	no	shell beads; Haliotis
696	98		28	35	adult	M+	-	left	236	104	A	96	yes (d,e)	yes	no
696	99		18	+	adult	-	tight flex	right	226	118	A	110	yes (d)	no	shell beads
696	100		15	26	adol/adult	-	tight flex	right	208	88	A	80	yes (a)	no	no
696	101		2	3	infant	-	-	-	-	124	A	121	yes (d)	no	no
696	102		22	26	adult	M-	-	-	-	120	A	117	no	no	no
696	103		30	35	adult	M+	tight flex	left	279	130	A	80	yes (o)	yes	no
696	104		35	+	adult	F+	tight flex	right	249	118	A	112	no	yes	shell beads
696	105		4	5	juvenile	-	-	left	-	104	A	98	yes (h)	yes	no
696	106		24	30	adult	F+	tight flex	right	200	106	A	100	yes (d,e,o,pc)	yes	shell beads
696	107		13	15	adolescent	-	-	-	-	82	A	70	yes (d,e)	no	no
696	107	A	26	29	adult	M	tight flex	left	200	82	A	70	yes (e)	yes	shell beads; point; canid mandible
696	108		13	16	adolescent	-	tight flex	right	230	105	A	99	no	no	no
696	109		42	+	adult	F+	-	-	-	119	A	96	yes (d,e)	yes	no
696	112		7	12	juvenile	-	-	left	290	131	A	63	yes (pc)	no	no
696	113		26	+	adult	F-	-	-	290	118	A	73	no	yes	no
696	114		16	18	adolescent	F+	loose flex	dorsal	220	107	A	62	yes (d,e)	yes	no
696	115		3	7	juvenile	-	cremation	-	-	106	A	103	no	no	shell beads
696	115	A	16	+	adol/adult	F-	cremation	-	-	106	A	103	no	yes	no

Upper Archaic Period

696	115	B	0.5	1	infant	-	-	-	-	106	A	103	no	no	no
696	116		18	+	adult	-	loose flex	left	232	111	A	109	yes (d)	no	no
696	117		28	34	adult	F	loose flex	right	208	120	A	118	yes (d,e,o,w)	yes	no
696	118		20	25	adult	-	-	-	195	87	A	85	yes (h)	no	no
696	119		26	35	adult	F+	tight flex	right	290	132	A	129	yes (d,o,w)	no	no
696	120		30	35	adult	M	tight flex	left	250	139	A	136	yes (d,p,w)	yes	no
696	120	A	24	31	adult	-	-	-	-	139	A	136	no	no	shell beads
696	120	C	18	+	adult	-	-	-	-	139	A	136	no	no	no
696	121		22	26	adult	-	-	-	-	114	A	110	no	no	no
696	122		25	31	adult	M+	loose flex	left	40	129	A	127	yes (a,d,e,pc)	yes	shell beads
696	123		19	24	adult	F+	tight flex	left	274	122	A	118	yes (d,e,h)	yes	no
696	124		30	+	adult	-	tight flex	left	248	115	A	111	yes (d)	no	fossil branch/root
696	125		18	+	adult	F-	tight flex	ventral	226	109	A	106	yes (e,h)	no	shell beads
696	126		25	30	adult	-	tight flex	right	233	117	A	115	yes (d,e,h,o)	no	no
696	127		18	25	adult	-	-	-	-	117	A	99	no	no	no
696	128		30	+	adult	F+	tight flex	left	80	125	A	117	yes (d)	no	schist pencil
696	129		15	23	adol/adult	-	tight flex	right	245	119	A	117	no	no	no
696	130		16	19	adol/adult	F-	tight flex	left	260	112	A	111	yes (d,e,h)	no	no
696	131		16	19	adol/adult	-	tight flex	ventral	227	111	A	110	yes (d,e,h)	no	no
696	132		29	38	adult	M-	tight flex	ventral	224	97	A	130	yes (e)	no	no
696	133		15	17	adolescent	-	loose flex	right	180	107	A	105	yes (e)	no	no
696	134		30	+	adult	F+	loose flex	left	200	108	A	106	yes (d)	yes	no
696	135		26	28	adult	M+	tight flex	right	224	109	A	107	yes (d,e,h,pc)	yes	no
696	136		26	30	adult	M+	loose flex	right	194	133	A	125	yes (d,e)	yes	no
696	137		14	17	adolescent	-	semi-extended	right	212	66	A	96	yes (d,e,h)	yes	shell beads
696	139		25	35	adult	M-	-	-	180	114	A	106	yes (d,e,m)	yes	C14: 1840 cal B.P.
696	140		30	+	adult	F-	tight flex	left	166	103	A	95	no	no	no
696	143		30	+	adult	M-	tight flex	right	206	72	A	105	yes (c,d,e,h,m,o,pc)	yes	no
696	145		40	45	adult	M	tight flex	left	294	49	A	99	yes (c,d,o,pc)	yes	shell beads
696	146		30	+	adult	-	tight flex	left	-	93	A	123	yes (d)	no	no
696	147		1.5	2.5	infant	-	loose flex	dorsal	207	119	A	116	no	no	shell beads
696	148		19	24	adult	M	tight flex	left	230	125	A	123	yes (d,e)	yes	shell beads
696	149		25	29	adult	F	tight flex	right	250	94	A	127	yes (d)	yes	no
696	150		15	+	adol/adult	-	-	-	-	102	A	99	yes (d,e)	no	no
696	151		22	26	adult	F	tight flex	dorsal	88	131	A	123	yes (a,d,pc)	yes	no
696	152		25	35	adult	M+	semi-extended	dorsal	273	126	A	118	yes (d,o,p)	yes	eagle carpo-metacarpus
696	152	A	15	+	adol/adult	M+	-	-	-	126	A	118	no	no	no
696	153		20	26	adult	F+	-	-	-	109	A	108	yes (a,e)	yes	no
696	153	A	30	+	adult	M+	-	-	-	109	A	108	yes (d,o)	yes	no
696	154		30	+	adult	M+	extended	ventral	318	137	A	136	yes (d,pc)	yes	no

Middle Archaic Period

Site	Burial	Sub	Age Min.	Age Max.	Age Class	Sex*	Position	Side	Orientation	Depth BD	Datum	Depth BS	Pathology**	Non-metrics	Assoc.
637	1		20	30	adult	F	tight flex	left	205	-	-	90	no	no	ochre
637	2		18	+	adult	-	-	-	-	31	M4	96	no	no	no
637	3		16	+	adol/adult	-	-	-	-	36	M4	121	no	no	no
637	4		25	35	adult	M	semi-extended	right	340	117	M4	183	yes (d,m)	no	no
637	5		20	24	adult	-	extended	ventral	340	52	M4	155	yes (d,e)	no	projectile point; C14: 5665 cal B.P.
637	6		22	26	adult	F	loose flex	right	290	102	M4	187	yes (d,e,m,p)	no	no
637	7		20	25	adult	F-	semi-extended	right	290	102	M4	191	yes (e,h)	no	projectile points; C14: 5795 cal B.P.
637	8		19	25	adult	F+	loose flex	left	357	53	M4	145	yes (d,e)	yes	no
637	9		18	22	adult	M	-	left		40	M4	120	no	yes	Haliotis shell
637	10		18	30	adult	F+	tight flex	right	280	90	M4	166	yes (h)	no	no
637	11		30	+	adult	-	-	-	-	29	M4	164	yes (d)	no	no
637	12		13.5	15	adolescent	-	extended	dorsal	290	113	M4	193	yes (d,e,h)	yes	no
637	13		18	+	adult	F-	-	-	-	52	M4	122	no	yes	no
637	14		30	35	adult	-	tight flex	left	270	101	M4	182	no	no	shell beads; ochre; C14: 4770 cal B.P.
637	15		10	12	juvenile	-	extended	dorsal	322	142	M4	221	yes (d,e,h)	no	no
637	16		18	+	adult	-	tight flex	right	180	37	M4	107	no	no	no
637	17		25	+	adult	-	-	-	-	34	M4	99	no	no	no
637	18		18	+	adult	-	-	left	-	46	M4	86	yes (h)	no	no
696	86		18	+	adult	-	tight flex	-	-	109	A	139	no	no	C14: 2765 cal B.P.
696	155		18	+	adult	F+	tight flex	left	127	182	A	181	yes (pc)	no	shell ornaments
696	158		38	+	adult	F	tight flex	left	110	256	M5	-	yes (d,m)	yes	no

Lower Archaic Period

Site	Burial	Sub	Age Min.	Age Max.	Age Class	Sex*	Position	Side	Orientation	**Depth** BD	Datum	**Depth** BS	Pathology**	Non-metrics	Assoc.
696	160		17	31	adult	F-	-	-	-	358	M6	-	no	yes	C14: 7400 cal B.P.

* M = male; M+ = probable male; M - = possible male; F = female; F+ = probable female; F- = possible female

** a = anomaly; c = cranial pathology; d = dental pathology or anomaly; e = enamel extension; h = dental hypoplasia; o = osteophytic growth; p = enamel pearl; pc = postcranial pathology; r = exostosis of the external auditory meatus; s = septal aperture in olecranon fossa, distal humerus; t = supernumerary tooth; m = congenital absence of M3; w = special-use wear on tooth

LOWER ARCHAIC

A single burial (Burial 160), interred in the Kellogg paleosol, dates to the Lower Archaic period. The individual was probably interred in a flexed position, although postdepositional processes and compaction due to heavy equipment made a more definite determination impossible. Burial 160 was capped by a cairn of sandstone cobbles, placed directly over the skeleton, possibly representing a burial marker. Despite removing several thousand cubic meters of sediment and soil in the vicinity of Burial 160, no additional human remains were discovered.

MIDDLE ARCHAIC

A total of 21 individual burials have been assigned to the Middle Archaic, including all of the burials recovered from CCO-637. Based primarily on depth differences and a single radiocarbon date, 3 burials from CCO-696 were clearly associated with this time period: 1 found in the Bkt horizon of the Vaqueros paleosol in the North Locus (Burial 158), and 2 associated with the Bkt horizon in the West Locus (Burials 86 and 155). Burials recovered from CCO-637 were found to be vertically separated within soil Unit I. Radiocarbon dates indicate that the two groups probably represent early and late Middle Archaic components. The lower group is composed of 10 burials, while the upper group includes 8.

Body position was recorded for 13 of the 21 interments. At CCO-696 and in the upper component at CCO-637, only tightly flexed burials were identified (n = 4). Burials found in the deeper component at CCO-637 were interred in a variety of positions, including 2 tightly flexed, 2 loosely flexed, 3 extended, and 2 semi-extended. Body orientation recorded for the deeper burials was found to be consistent—all 10 were directed with the head toward the northwest quadrant, from 270 to 360 degrees. In contrast, the tightly flexed interments from CCO-696 and the upper component at CCO-637 were all oriented between southeast and west (110 to 280 degrees). Of the tight and loosely flexed burials, 5 were adult females and 2 were indeterminate adults. Of the extended and semi-extended burials, 1 was an adult male, 1 was an adult possible female, 1 was an indeterminate adolescent, 1 was and indeterminate juvenile, and 1 was an indeterminate adult.

Grave goods were identified with 6 burials: 5 at CCO-637, and 1 at CCO-696. Three side-notched projectile points were found with 2 extended burials (1 extended, 1 semi-extended) in the lower group at CCO-637; 1 was an indeterminate adult (Burial 5) and the other was an adult possible female (Burial 7). A third indeterminate adult burial from the lower group (Burial 14) was recovered with over 1,000 *Olivella* shell beads (Table IV.34; Figure IV.8). The beads were found in patterns around the pelvic region, suggesting that they may have been sewn to a garment or belt. The remains of Burial 14 and the surrounding burial pit appeared to be stained with red ochre. In addition, a thin concentrated lens of charcoal was identified directly below the skeletal remains, interpreted as evidence for pre-interment grave-pit burning. A modified *Haliotis* shell was recovered with an adult male and a lump of red ochre was found above the knee of an adult female, both from the upper group of burials at CCO-637. Twenty two *Haliotis* ornaments were associated with an adult female (Burial 155) found in CCO-696 West. The oblong ornaments were aligned linearly around the torso of the burial, a pattern indicating that they may have been strung or sewn to a garment.

UPPER ARCHAIC

A total of 154 burials from CCO-696 dated to the Upper Archaic period. The burials were primarily located in the West Locus, concentrated within the northern end of Exposures 1 and 2. Although the majority of burials were placed within a narrowly defined area, it remains unclear whether this constellation represented an intentional cemetery or was simply a result of the way in which space was organized over time. That is, burials could accumulate in a specific part of a site incidentally, in response to the spatial distribution of other site features, such as dwellings, bulk-processing facilities, work areas, and refuse accumulations. For example, if it was customary to bury

the dead alongside the house or through the house floor, then continued placement of dwellings within the same portion of the site would also result in a concentration of burials in that location. The habitation debris (e.g., flaked-stone debitage, burned faunal remains, fire-affected sandstone cobbles) frequently found in burial matrices, indicates that, at least over time, burial areas were not separate from residential space.

Regardless of the intention, continued interment within the same portion of the site frequently resulted in the disturbance of earlier burials. The following is a list of burials that were found superimposed and/or mixed:

Burials:	5 & 5A	Burials:	79, 106, 132, 133, & 134
	17 & 20		82 & 82A
	16, 23, & 24		90, 90A, 90B, & 101
	28 & 28A		99, 128, & 136
	33 & 58		91, 92, 93, 120, 120A, & 120C
	35 & 36		115, 115A, 115B
	38, 38A, & 38B		107 & 107A
	39, 59, 60, & 61		139 & 140
	41, 76, & 87		152 & 152A
	44 & 77		153 & 153A
	70 & 70A		

Although the majority of these burial groupings appear to have accumulated from separate events, at least two double-burials (13,14 and 126,131) were recorded. Each was composed of individuals interred face-to-face in flexed positions, with arms and legs intertwined. Due to the disarticulation, Burial 153 probably represented a secondary interment, as did Burial 29, a disassociated cranium found in the Brentwood alluvium.

Of the 154 Upper Archaic burials, 97 were interred in a flexed position (73 tight and 18 loose flex), 6 were extended (2 extended, 4 semi-extended), 2 were cremated, and 52 were so deteriorated and/or disturbed that no position could be recorded. Burials were either placed ventrally (2 extended, 14 tightly flexed), dorsally (5 tightly flexed, 3 loosely flexed, 1 semi-extended), or on the left (9 loosely flexed, 1 semi-extended, 27 tightly flexed) or right side (6 loosely flexed, 2 semi-extended, 34 tightly flexed).

Significantly, approximately 80% of the Upper Archaic burials with recorded positions were oriented with the head between south and west (180 to 270 degrees), including 80% of the flexed burials and 50% of the extended burials. There was no significant variation identified between body position and age/sex categories. The only cremated burials were subadults: an infant and a juvenile (Burial 115, 115A).

Artifact associations were recorded with approximately 40% of the interments (n=61), including 40 tight flex (66%), 8 loose flex, 7 indeterminate, 4 semi-extended, 1 extended, and 1 cremation. Spatially, interments with artifact associations were primarily located within the main burial concentration in Exposures 1 and 2. *Olivella* shell beads were the most frequent association recovered with 58 burials (Table IV.34). Shell beads were found with 2 infants, 4 juveniles, 2 adolescents, and 50 adults (8 females, 3 possible females, 12 males, 2 possible males, and 33 indeterminate). *Olivella* Spire-Lopped beads associated with Burial 90 were found in patterns around the waist area, suggesting that they may have been part of a belt or decoration sewn to a garment. *Olivella* Split beads recovered with Burial 37 and Saucer beads collected with Burials 83 and 148 were found in linear patterns indicating that they may have been strung.

Haliotis shell ornaments were found with 2 adult males, 1 juvenile, and 3 indeterminate adults. All of the adults also had shell-bead associations. One unmodified *Haliotis* shell fragment was recorded with an infant burial (Burial 87). A shaped mortar, pestle, and unmodified bear metatarsal

TABLE IV.34
SHELL BEADS AND HUMAN REMAINS AT LOS VAQUEROS PROJECT BY BEAD TYPE

SITE	Burial #	Frags	A1	A1a	A1b	A1c	A2c	B2	B2a	B2b	B2c	C	F3a	G	G1	G2a	G2b	G3b	L	L1	L2	L3	MA	M1a	Assoc.	Exp.
CCO-637	BUR14	73	96	175	171	40	1		50	62	1								371	8	3	119			1,170	
CCO-696	BUR1			1																						1
	BUR14			2	2																		1		5	
	BUR16+	2	2	1												1							5		11	
	BUR18				1																				1	
	BUR23		1																						1	
	BUR26		2	4	5																				11	
	BUR27													1		7									8	
	BUR30	4		19	1									4	7										35	
	BUR31	3		3																					6	
	BUR32											1											1		2	
	BUR33																						28		28	
	BUR34											1				1							1			3
	BUR34	4		50	3							9			3	3									72	
	BUR35														1	1									2	
	BUR35,36	4	16	35	6							32			18	29		1								141
	BUR36	1		2	2							2			1	1									9	
	BUR37			3	2							118													123	
	BUR39			2	2																					4
	BUR40			3	2																				5	
	BUR41	3	4	16											1	1									25	
	BUR42	2										2				1									5	
	BUR43			1	2																				3	
	BUR45																						5		5	
	BUR46	2	1		1	1									1										6	
	BUR48			6	1											1									8	
	BUR53	1	3	27	6										4	80									121	
	BUR55			3	1							1			1										6	
	BUR56					1																			1	
	BUR57			12	2							5			83	37									139	

BUR58			2																			3		5	
BUR59			5	1																				6	
BUR60	5	1	17	11										60		1								95	
BUR65			3									1											1	5	
BUR69			2	3										1	2									8	
BUR70	4	3	9	3									1	2										22	
BUR71														1										1	
BUR73				1																				1	
BUR76		22	18	1										9	14									64	
BUR78																						73		73	
BUR81		11	32	3										1										47	
BUR82		29	44	1							4			3	1							1		83	
BUR83	4	65	261	63									103	335	1,978									2,809	
BUR84			7											1										8	
BUR85													4	3	14									21	
BUR88		4	41	4										2	41									92	
BUR90	5	22	138	17							4			12	7									205	
BUR91				2																				2	
BUR95		1	1	1										3	3									9	
BUR97													2	6	12									20	
BUR99				1																				1	
BUR104		3	18	1																				22	
BUR106			1											2										3	
BUR107A				1																				1	
BUR115				1																				1	
BUR120A				1							1			3	3									8	
BUR122																						1		1	
BUR125			1																					1	
BUR137		11	143	13																				167	
BUR145			12	1																				13	
BUR147		1	20	40																				61	
BUR148		1	4	3									32	150	29									219	
BUR153			1																						1
BUR157							10	4	33															47	
Total	117	299	1,145	383	42	1	10	54	95	1	180	1	147	714	2,267	1	1	371	8	3	119	119	1	5,929	150

were found with an adult female (Burial 27), a shaped mortar was identified with an indeterminate adult (Burial 57), and a shaped pestle was recorded with another indeterminate adult (Burial 76). Both *Olivella* Saucer and Spire-Lopped beads were associated with all 4 of these burials. The only bone artifacts recovered were 4 curved-to-flat "wands" or strigils identified with Burial 81. A canid mandible fragment and a contracting stem projectile point were associated with an adult male (Burial 107A), and an eagle carpometacarpus was found in the mouth of another adult male. A quartz crystal and *Olivella* Saucer and Spire-Lopped beads were associated with both an adult male (Burial 30) and an indeterminate adult (Burial 48). In addition, an adult female (Burial 128) was found with a bipointed schist "pencil," and a fossilized branch/root was collected with an indeterminate adult (Burial 124).

UPPER ARCHAIC/EMERGENT PERIOD

Burials assigned to the Upper/Archaic Emergent period included 13 extended burials found in the South Locus of CCO-696. They were distinguished by their extended burial position (9 extended, 4 semi-extended) and spatial and vertical distribution within the site. The burials averaged approximately 30 cm shallower than the Upper Archaic burials and were primarily found in groups located along the former creek banks in the northeastern and southwestern portions of the South Locus. Eleven of the 13 burials were in a ventrally extended position, including 8 females, 2 males, and 1 indeterminate. The other 2 burials were dorsally extended males. In contrast to the southwest orientation of the earlier interments at CCO-696, 85% (n=11) of the Upper Archaic/Emergent-period burials were oriented with the head between northeast and northwest (21 to 290 degrees). None of these burials had artifact associations.

EMERGENT PERIOD

A total of 7 burials were dated to the Emergent period. These included 2 adult females and 1 neonate/infant from CCO-458 West, 2 adult males and 1 indeterminate adult from CCO-696 North, and 1 neonate/infant from CCO-459. Emergent-period burials did not seem to be spatially segregated from work and/or habitation areas, but rather, occurred in the midden deposits, frequently in close proximity to residential or processing features.

One adult female from CCO-458 (Burial 1) and 1 indeterminate adult from CCO-696 North (Burial 157) were cremations. The 2 adult males from the North Locus were tightly flexed, one dorsally and one on the left side, oriented towards 108 and 306 degrees. The other 3 burials were so disturbed and/or deteriorated that no position or orientation could be determined. A fire-cracked, cylindrical pestle, 47 *Olivella* End Ground beads, and a Stockton series projectile point were associated with Burial 157, while a Stockton series projectile point was associated with Burial 159 in CCO-696 North. Although the association was unclear, complete Stockton series points were also recovered from the exposure matrices of Burials 1 and 2 at CCO-458.

SUMMARY OF MORTUARY PATTERNS

Burial treatment was found to vary over time in the Los Vaqueros Project area. The oldest burial, dated to the Lower Archaic, was covered by a cairn of sandstone cobbles. Burials from subsequent time periods, however, lacked this form of grave preparation. The earliest Middle Archaic burials were oriented toward the northwest quadrant, with half of the interments placed in an extended or semi-extended position. Later Middle Archaic burials were all tightly flexed and lacked clear patterning in the direction of orientation. During the Upper Archaic period, burials continued to be placed primarily in a flexed position; approximately 80% of the interments, however, were oriented with the head towards the southwest quadrant. A shift in burial patterns took place once again during the Upper Archaic/Emergent-period transition. Burials dating to this time period were placed in an extended position oriented in a northerly direction. During the subsequent Emergent period, cremation of the

dead became a common practice, although, at least half of the adults were also buried in a tightly flexed position.

The earliest artifact associations were recovered with the Middle Archaic burials. Artifacts were found with approximately 30% of the interments, including both adult males and females. Projectile points and marine shell beads and ornaments were the most common associations, although, they only occurred with 5 individuals. Red ochre, not found during later time periods, was also identified with two burials. At least one individual (Burial 14) appeared to have special status, indicated by the grave preparation (pre-interment grave-pit burning), over 1,000 *Olivella* shell beads, and the powdered red ochre found throughout the burial matrix. Shell beads and ornaments dating to the Middle Archaic appear to have been primarily affixed to garments or other regalia.

Artifacts were recovered with approximately 40% of the Upper Archaic burials, including males and females, adults and subadults. Shell beads and ornaments were the most common associations. A single adult interment (Burial 83) had approximately 2,800 beads, which accounted for 60% of the total beads recovered dating to the Upper Archaic; 13 burials (22%) had from 50 to 300 beads, and 44 burials (76%) had from 1 to 49 beads. In addition to representing decoration on garments, beads were found in patterns indicating that they had been strung. A variety of other associations were also identified, including finely made mortars and pestles that probably represented wealth or special-use items rather than utilitarian artifacts. Although projectile points were relatively common with the Middle Archaic burials, only 1 out of the 154 individuals dating to the Upper Archaic was interred with this type of artifact.

No associations were found with the 13 Upper Archaic/Emergent period burials. Two of the 7 Emergent-period burials had associated artifacts. These included shell beads, a cylindrical pestle, and a projectile point found with a cremation, and a finely made projectile point found with a flexed burial.

HUMAN OSTEOLOGY

DEMOGRAPHIC PROFILE

Although a relatively large number of human burials was recovered, the poor overall preservation of the remains limited our ability to make even basic age and sex determinations for many of the individuals. In addition, when the burials were grouped by time period, the sample size decreased even further, with only the Upper Archaic group remaining statistically robust. Despite these problems, analysis of the mortality profile provides some estimation of the structure of the Los Vaqueros population over time (Figure IV.17).

Generally, adults did not live past the fifth decade, with most dying before the age of 40. Subadults made up 8, 18, and 10% of the burials from the Middle Archaic, Upper Archaic, and Upper Archaic/Emergent periods, respectively. Subadults accounted for close to 30% of the interments during the Emergent period. The higher frequency of subadults later in time is probably related to the small sample size, as well as the results of differential preservation. Infants and neonates (less than 3 years) were only represented in the Emergent and Upper Archaic periods.

Of those individuals who could be reliably sexed, roughly half were female (n=39) and half were male (n=38). When divided by time period, men were more frequently identified from the Emergent (67%) and Upper Archaic (56%) periods, and females were more frequently identified from the Middle Archaic (75%) and Upper Archaic/Emergent periods (67%).

Considering the mortality frequencies of females from the three time periods in which they could be reliably aged, the highest number of deaths occurred between 21 to 25 years. Peaks in male mortality generally corresponded with females, however, due to the small sample size there was no clear trend over time. During the Upper Archaic, where sufficient numbers of males and females allowed for comparison, the peak in female deaths was between 21 and 30 years, whereas, male death rates increased to a peak between 31 and 35 years, dropping dramatically thereafter.

OSTEOMETRICS

Metric comparisons were limited by the fragmentary condition of most skeletal elements recovered during the project. Summaries of selected postcranial measurements are provided in Table IV.35. Taking into account sample size, no significant variations in the mean measurements were observed between time periods. Within the relatively large Upper Archaic population, postcranial osteometrics provide evidence for a certain degree of sexual dimorphism (Table IV.36). Due to the poor condition of the long bones, stature estimates are only available for 8 individuals. Six males ranged from 158 to 174 cm (5'3" to 5'8") in height, while 2 females were 155 and 176 cm (5'2" and 5'9"). Cranial measurements were also quite limited, with insufficient data to develop comparative indices.

PATHOLOGIES

Identification and enumeration of pathological conditions within the Los Vaqueros burial population was affected by the absence and fragmentary nature of most skeletal elements. Periosteal reaction (periostitis) resulting from trauma, infection, or disease (Ortner and Putschar 1981:132) was recorded for two burials. Periostitis was identified on the right fibula of an adult female dating to the Upper Archaic period (Burial 12) and on the left tibia of an indeterminate adult dating to the Upper Archaic/Emergent period (Burial 68). A bacterial infection of the bone, known as osteomyelitis (Ortner and Putschar 1981:105), was recognized on the right ulna of an adult male dating to the Upper Archaic/Emergent period (Burial 111). Anemic reaction (Ortner and Putschar 1981:259), in the form of porotic hyperostosis and cribra orbitalia, was identified on the crania of 2 individuals: an Upper Archaic/Emergent period, adult female (Burial 110), and an Emergent Period, adult male (Burial 156).

One of the most frequently recorded pathologies was arthritis, or degenerative joint disease (DJD), affecting approximately 16% of the total Los Vaqueros burial population (n=31). DJD was found to occur equally among males (30%) and females (28%), with most arthritic changes identified in the vertebral column, primarily on the cervical vertebrae. Males and females showed similar patterns of DJD affected joints, including feet, legs, hands, and arms. When broken down by time period, DJD affected 50% of the females (n=4) and 25% of the males (n=2) during the Upper Archaic/Emergent period, and 25% of the females (n=6) and 33% of the males (n=10) during the Upper Archaic period. DJD was recorded for 1 adult from the Emergent period and no individuals from the Middle Archaic period. These patterns, particularly for the Middle and Upper Archaic periods, are undoubtedly biased by the poor preservation of the most frequently affected elements (e.g., vertebrae and feet).

Dental pathologies and related complications—including attrition, periodontal disease, hypoplasia, and carious lesions—were relatively common. In addition, special use-wear, appearing most frequently as interproximal transverse gooves, was identified on the dentition of 8 individuals. These grooves, which probably resulted from use of the teeth in a repetitive processing activity, appeared only on adult burials from the Upper Archaic, including 2 females and 2 males. (See Table IV.37 for a summary of pathologies and other nonmetric attributes.)

TABLE IV.35
POSTCRANIAL MEASUREMENTS
ON LOS VAQUEROS PROJECT HUMAN REMAINS, ALL TIME PERIODS

Measurement	Emergent* Mean	n	Range	s.d.	Upper Archaic/Emergent Mean	n	Range	s.d.
Clavicle midshaft circumference	39.0	1	-	-	34.1	8	28.5-39.0	3.7
Maximum humerus length	-	-	-	-	297.0	1	-	-
Humerus head diameter	-	-	-	-	39.6	4	37.8-41.7	1.6
Humerus biepicondylar breadth	-	-	-	-	57.8	5	50.3-64.5	6.0
Humerus midshaft circumference	63.0	1	-	-	60.5	11	54.0-75.0	5.9
Radius head diameter	20.0	2	19.5-20.5	0.7	21.5	9	19.7-23.9	1.7
Maximum ulna length	-	-	-	-	274.0	1	-	-
Ulna maximum diameter A-P	15.2	2	15.1-15.2	0.1	15.3	11	11.7-19.8	2.5
Maximum femur length	-	-	-	-	412.3	3	392-429	18.8
Femur epicondylar breadth	-	-	-	-	77.1	3	72.9-81.9	4.5
Femur head diameter	42.4	1	-	-	45.0	9	39.2-52.9	4.5
Femur midshaft diameter A-P	26.5	2	23.8-29.1	3.7	26.7	12	21.0-34.2	4.0
Femur midshaft circumference	83.0	2	81-85	2.8	81.5	11	70.0-96.0	9.7
Maximum tibia length	-	-	-	-	355.0	2	324-386	43.8
Tibia midshaft diameter A-P	28.8	1	-	-	29.3	6	24.8-35.4	4.5
Maximum fibula length	-	-	-	-	313.0	1	-	-
Fibula midshaft diameter	-	-	-	-	15.3	10	11.7-18.0	1.9.

*adults only; CCO-458, -696N

*adults only; CCO-696

Measurement	Upper Archaic Mean	N	Range	SD	Middle Archaic* Mean	N	Range	SD
Clavicle midshaft circumference	34.7	18	23.0-40.0	4.3	-	-	-	-
Maximum humerus length	287.0	1	-	-	-	-	-	-
Humerus head diameter	42.2	6	38.4-45.6	2.7	-	-	-	-
Humerus biepicondylar breadth	58.0	6	51.1-64.4	5.6	-	-	-	-
Humerus midshaft circumference	63.0	49	53.0-73.0	5.4	60.0	4	53-64	5.9
Radius head diameter	20.2	14	16.7-25.6	2.2	20.8	1	-	-
Maximum ulna length	224.5	2	224-225	0.7	-	-	-	-
Ulna maximum diameter A-P	15.6	40	9.9-20.3	2.2	15.2	5	12.5-17.0	1.9
Maximum femur length	451.0	2	437-465	19.8	-	-	-	-
Femur epicondylar breadth	77.1	2	69.8-84.4	10.3	-	-	-	-
Femur head diameter	45.0	26	38.6-52.3	3.7	45.5	3	41.9-48.7	3.4
Femur midshaft diameter A-P	28.9	66	23.0-35.0	3.1	26.9	10	23.0-33.0	3.0
Femur midshaft circumference	86.2	65	72.0-101.0	6.7	81.7	7	71-95	7.9
Maximum tibia length	-	-	-	-	-	-	-	-
Tibia midshaft diameter A-P	29.7	30	24.0-37.1	2.9	24.0	1	-	-
Maximum fibula length	317.3	3	295-332	19.7	-	-	-	-
Fibula midshaft diameter	15.8	39	10.6-20.3	2.2	13.9	5	11.7-17.5	2.3

*adults only; CCO-696

*adults only; CCO-637 & CCO-696

TABLE IV.36
POSTCRANIAL MEASUREMENTS FOR UPPER ARCHAIC HUMAN REMAINS
LOS VAQUEROS PROJECT

	Females*				Males**			
Measurement	**Mean**	**N**	**Range**	**SD**	**Mean**	**N**	**Range**	**SD**
Clavicle midshaft circumference	32.8	10	23-39	4.9	35.6	18	31.0-40.0	2.4
Maximum humerus length	292.0	2	287-297	7.1	-	-	-	-
Humerus head diameter	39.1	5	37.8-40.3	1.0	43.2	6	40.2-45.6	2.0
Humerus biepicondylar breadth	53.3	5	50.3-56.5	2.6	62.8	5	58.4-64.5	2.5
Humerus midshaft circumference	58.9	26	53-67	3.9	65.7	22	53.0-73.0	5.0
Radius head diameter	20.0	11	18.1-22.3	1.2	22.4	11	18.7-25.6	1.8
Maximum ulna length	256.0	2	225-287	43.8	274.0	1	-	-
Ulna maximum diameter A-P	13.8	17	9.9-16.8	2.0	16.5	21	11.1-20.3	2.3
Maximum femur length	415.0	3	392-437	22.5	447.0	2	429-465	25.5
Femur epicondylar breadth	71.4	2	69.8-72.9	2.2	81.0	3	76.6-84.4	4.0
Femur head diameter	42.5	15	38.6-49.8	3.3	48.3	16	45.6-52.9	2.3
Femur midshaft diameter A-P	25.9	24	21.0-33.0	2.7	30.6	23	23.5-34.4	2.6
Femur midshaft circumference	80.5	24	70.0-95.0	5.7	89.8	23	72.0-97.0	5.6
Maximum tibia length	324.0	1	-	-	386.0	1	-	-
Tibia midshaft diameter A-P	28.1	17	24.0-37.9	3.2	32.2	13	28.9-37.1	2.2
Maximum fibula length	313.0	1	-	-	339.7	3	325-362	19.7
Fibula midshaft diameter	15.2	17	10.6-17.8	1.7	16.1	21	12.7-19.5	1.8

*adults only; does not include possible females

**adults only; does not include possible males

Resorption of the aveolar bone, associated with periodontal disease, was recognized on 14 individuals, including 8 adult males and 4 adult females. Periodontal disease affected 3 adult females from the Upper Archaic/Emergent period (38%), 1 adult female (4%), 1 indeterminate adult, and 7 adult males from the Upper Archaic period (23%), and 1 adult male from the Middle Archaic period.

Of the 14 individuals identified with dental caries (7%), 7 were adult males, 3 were adult females, and 4 adults could not be sexed. Carious lesions were found on 5 (17%) males, 2 females (5%), and 4 (4%) indeterminate adults from the Upper Archaic, 1 female (12%) from the Upper Archaic/Emergent, and both males from the Emergent period.

Hypoplastic defects of the enamel matrix, resulting from disease or nutritional deficiencies (Schulz 1981:118-120), were the most frequently recorded pathology in the Los Vaqueros population. A total of 48 burials (24%) exhibited dental hypoplasia, including 5 from the Middle Archaic (25%), 36 from the Upper Archaic (23%), 6 from the Upper Archaic/Emergent (46%), and 1 from the Emergent period (14%). Hypoplastic defects were more common on females (34%) than on males (24%), and were more frequently identified on subadults (27%) than on adults (24%). When considered by time period, hypoplastic defects were distributed between sex and age categories as follows:

Middle Archaic	Female = 2 (33%) Indeterminate = 3 (17%) Juvenile = 1 (100%)	Adult = 3 (17%) Adolescent = 1 (100%)
Upper Archaic:	Female = 6 (25%) Male = 7 (23%) Indeterminate = 23 (18%)	Adult = 29 (23%) Adolescent = 3 (27%) Juvenile = 4 (33%)
Upper Archaic/Emergent:	Female = 5 (63%) Male = 1 (25%)	Adult = 6 (50%)
Emergent:	Male = 1 (50%)	Adult = 1 (20%)

Although the specific etiologies of most of these pathological conditions are not well defined, in addition to precipitating factors, such as disease, at least two pathologies have been attributed to nutritional deficiencies: dental hypoplasia and porotic hyperostosis/cribra orbitalia. Combined, these conditions occurred in the highest frequency during the Upper Archaic/Emergent period, as did osteomyelitis and nonspecific periostitis. Multiple stress indicators were exhibited on 2 individuals. One Upper Archaic/Emergent-period burial (Burial 110) exhibited both cribra orbitalia and dental hypoplasia and 1 Emergent-period burial (Burial 156) displayed hypoplasia and porotic hyperostosis. Although the number of Upper Archaic/Emergent and Emergent-period burials was small in comparison to the number of Upper Archaic burials, these data suggest that disease and or nutritional deficiencies were more pervasive during the latest time periods. This conclusion, however, is tempered to some degree by the identification problems associated with the poor preservation of skeletal remains from the Upper and Middle Archaic periods.

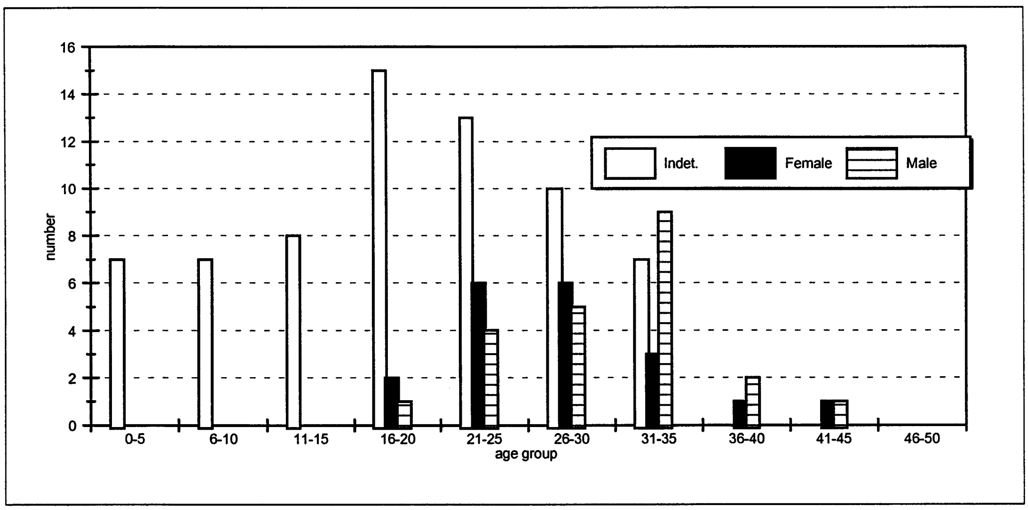


Figure IV.17. Mortality Profile, Upper Archaic Burials, CA-CCO-696 West, Los Vaqueros

TABLE IV. 37
NONMETRIC TRAITS AND PATHOLOGIES BY TIME PERIOD AND SEX
LOS VAQUEROS PROJECT HUMAN REMAINS

Trait	Upper Archaic/Emergent All	n=13	Upper Archaic/Emergent Females	n=7	Upper Archaic/Emergent Males	n=4
	n	%	n	%	n	%
anomaly (including supernumerary teeth and postcranial anomalies)	4	30.8	3	42.9	-	-
cranial pathology	2	15.4	1	14.3	1	25.0
dental pathologies and anomalies	7	53.8	6	85.7	1	25.0
enamel extension	2	15.4	1	14.3	1	25.0
dental hypoplasia	6	46.2	5	71.4	1	25.0
osteophytic growth	5	38.5	3	42.9	2	50.0
enamel pearl	2	15.4	1	14.3	1	25.0
postcranial pathology	3	23.1	2	28.6	1	25.0
auditory exostosis	-	-	-	-	-	-
septal aperture in olecranon fossa, distal humerus	1	7.7	1	14.3	-	-
supernumerary tooth	1	7.7	1	14.3	-	-
special use-wear on tooth			-	-	-	-
congenital absence of M3	1	7.7	-	-	1	25.0

Trait	Upper Archaic All	N=156	Upper Archaic Females	N=27	Upper Archaic Males	N=32
	n	%	n	%	n	%
anomaly (including supernumerary teeth and postcranial anomalies)	15	9.6	4	14.8	4	12.5
cranial pathology	5	3.2	0	0	3	9.4
dental pathologies and anomalies	88	56.4	17	63.0	23	71.9
enamel extension	57	36.5	12	44.4	16	50.0
dental hypoplasia	37	23.7	6	22.2	7	21.9
osteophytic growth	22	17.3	6	22.2	8	25.0
enamel pearl	4	2.6	2	7.4	2	6.3
postcranial pathology	20	12.8	6	22.2	9	28.1
auditory exostosis	3	1.9	2	7.4	1	3.1
septal aperture in olecranon fossa, distal humerus	0	0	0	0	-	-
supernumerary tooth	4	2.6	0	0	1	3.1
special use-wear on tooth	8	5.1	2	7.4	2	6.3
congenital absence of M3	3	1.9	1	2.9	0	0

Table IV.37, continued

Trait	Middle Archaic All n = 18		Middle Archaic Females n = 7		Middle Archaic Males N=2	
	n	%	n	%	N	%
anomaly (including supernumerary teeth and postcranial anomalies)	-	-	-	-	-	-
cranial pathology	-	-	-	-	-	-
dental pathologies and anomalies	8	44.4	4	57.1	1	50.0
enamel extension	6	33.3	3	42.9	-	-
dental hypoplasia	5	27.8	2	28.6	-	-
osteophytic growth	-	-	-	-	-	-
enamel pearl	1	5.6	1	14.3	-	-
postcranial pathology	1	5.6	1	14.3	-	-
auditory exostosis	-	-	-	-	-	-
septal aperture in olecranon fossa, distal humerus	-	-	-	-	-	-
supernumerary tooth	-	-	-	-	-	-
special use-wear on tooth	-	-	-	-	-	-
congenital absence of M3	3	16.7	2	28.6	1	50.0

PART V
SUMMARY AND CONCLUSIONS

CHAPTER 10
SUMMARY AND CONCLUSIONS

Seven prehistoric archaeological sites and one potential site were treated under the Historic Property Treatment Plan (HPTP) for the reservoir and dam phase of the Los Vaqueros Project (SSUAF 1994b): CA-CCO-447/H, CCO-458/H, CCO-459, CCO-468, CCO-469, CCO-636, CCO-637, and S-20. One prehistoric archaeological site, CCO-696, was treated under the Late Discoveries HPTP (SSUAF 1995). Two other locations, CA-CCO-621/H and CCO-631, were also investigated.

Field investigations at three of the sites (CCO-621/H, -447/H, and S-20) revealed little or no prehistoric cultural material, while the work at CCO-631 involved identifying and collecting human remains and artifacts inadvertently deposited in the Vasco Road right-of-way. These four locations were situated outside of the dam-construction and reservoir-inundation areas.

The nature of the six archaeological deposits investigated within the reservoir area varied considerably, ranging from sparse or well-developed surface sites to buried, stratigraphically complex, multicomponent deposits. Three bedrock mortar sites were investigated, two of which (CCO-468, -469) included a sparse assortment of associated cultural material, while the third (CCO-459) contained an extensive buried deposit composed of several features, lithic debris, and a variety of floral and faunal remains. Two other surface deposits were excavated: CCO-636, composed of a diffuse scatter of lithic debris and groundstone tools; and CCO-458/H, a well-developed midden site containing a dense accumulation of habitation debris, several residential features, and human burials.

Buried archaeological deposits were identified at two sites: CCO-637 and -696. Cultural materials recovered from site CCO-637, associated with a buried paleosol, included flaked-stone debitage and tools, groundstone, features, and human burials. Archaeological deposits at site CCO-696 were associated with two paleosols: the younger of the two contained a moderately dense accumulation of habitation debris, numerous residential features, and scores of human burials; the older paleosol contained a dispersed deposit of habitation debris, flaked and groundstone artifacts, a cache feature, and a human burial.

RESEARCH ISSUES

Research issues identified for prehistoric sites in the evaluation report (SSUAF 1992:40-53) and summarized in the second HPTP (SSUAF 1994b:4-7) included Cultural Chronology, Subsistence and Settlement, and Interaction and Exchange. The subsurface survey program in the reservoir area has enabled the addition of a fourth research issue: Landscape Evolution. Findings from the Los Vaqueros prehistoric archaeological investigations relevant to these issues are discussed below and graphically displayed in Figure V.1.

CULTURAL CHRONOLOGY

As no prehistoric sites in the Los Vaqueros watershed had been subjected to subsurface investigation, the research questions posited at the project's beginning were directed towards defining a basic cultural sequence. The questions, which follow, are addressed in this section with considerably more success than had been anticipated in 1992.

Does the Los Vaqueros area conform to Fredrickson's chronology?

Do sites in the Los Vaqueros area date to before 1500 B.P.?

Are older sites present in the Kellogg Creek watershed that have been buried by alluvial deposits?

If multi-component sites are present in the Kellogg Creek watershed, do settlement patterns change over time?

Chronological data obtained during the project revealed an unusually long and complex sequence of human occupations, a record unparalleled in the lowlands of central California. Most synthetic and theoretical studies in central California to date have dealt with the latter one-third of the archaeological record, a fact disguised by the use of the terms "early," "middle," and "late" to describe assemblages less than 5,000 years old (cf. Bennyhoff and Hughes 1987: Figure 10). Rather than characterizing half of the components from Los Vaqueros as "early," we opted for Fredrickson's (1994a, 1994c) more inclusive terminology, which divides the record into three basic periods: Paleoindian, Archaic, and Emergent, with the Archaic subdivided into Lower, Middle, and Upper periods, and the Emergent into Lower and Upper periods. For our purposes, we have adjusted the temporal divisions between Paleoindian (+10,000 B.P.), Lower Archaic (10,000 to 6000 B.P.), and Middle Archaic (6000 to 2500 B.P.) to better conform with the timing and nature of the Los Vaqueros record. More specific cultural-historical attributions for various components within the Los Vaqueros Project area follow Bennyhoff and Fredrickson's (1994:21-24) concepts and definitions for regional Patterns and Aspects (see Research Issues in Chapter 3). The chronological sequence identified in the Los Vaqueros watershed is compared to Fredrickson's (1974) scheme in Figure V.1

Lower Archaic

Chronological data obtained during the Los Vaqueros project provided evidence for human use of the Kellogg Creek drainage beginning during the Lower Archaic period (10,000 to 6000 B.P). A sparse but diverse assemblage was found at depths greater than 330 cm below surface, identified in the North and West loci of CCO-696. The archaeological deposit was associated with the Kellogg paleosol, a chronostratigraphic unit that dates from about 11,000 to 6600 B.P. Three cultural radiocarbon dates from this deposit ranged from 9870 to 7400 cal B.P., indicating occupation over a 2,500-year period. Consistent with these dates, a large wide-stem projectile point of Napa Valley obsidian produced a hydration reading of 6.9 microns (7300 B.P.). The remainder of the hydration evidence was less resolute, with Napa Valley hydration readings ranging from 2.6 to 1.3 microns. Although no comparable assemblage has been previously identified in the San Francisco Bay and Central Valley–Delta regions, similar manifestations subsumed under the Borax Lake pattern have been identified in the southern North Coast Ranges (Bennyhoff and Fredrickson 1994:24; Rosenthal, Meyer, and White 1995; White and Fredrickson 1992:42) and appear to be widespread throughout California during the Lower Archaic period (Basgall and True 1985; Fitzgerald 1993; LaJeunesse and Pryor [1997]; McGuire and Hildebrandt 1994; Pryor and Weisman 1991).

Middle Archaic

Evidence for Middle Archaic use (6000 to 2500 B.P) of the project area comes from the late-Pleistocene to late-Holocene-age soil Unit I (11,000 to 600 B.P.) at CCO-637 and from the middle- to late-Holocene-age Vaqueros paleosol (6600 to 600 B.P.) in the North and West loci of CCO-696. The appearance of this adaptation at Los Vaqueros comes about 1,000 years earlier than Fredrickson's (1974) scheme. A reasonably well-developed deposit identified at CCO-637, produced four radiocarbon dates ranging from 5795 to 2585 B.P. Based on the chronostratigraphy and a single radiocarbon date of 2765 cal B.P., at least three burials from the Bkt horizon of the Vaqueros paleosol also appear to date to the Middle Archaic. While the majority of obsidian-hydration readings from both sites average considerably younger, a limited number of Napa Valley and Bodie Hills rim values correspond with the later Middle Archaic period, ranging from 4.0 to 5.1 microns (2500 to 4000 B.P.). Mixed burial postures, a general lack of grave goods, and an exclusive use of the mortar and pestle suggest that the Middle Archaic assemblage from Los Vaqueros may represent an unusually early manifestation of the Berkeley pattern.

Upper Archaic

The primary deposit identified in the West Locus of CCO-696 is associated with the Upper Archaic period (2500 to 1000 B.P). Temporally diagnostic shell-bead types and six radiocarbon dates indicate that the component dates between 2355 and 1320 B.P., with the most intensive occupation occurring between about 2350 and 1800 B.P. Napa Valley and Bodie Hills obsidian-hydration readings, ranging from 3.9 to 2.9 microns, correspond with the Upper Archaic component. The assemblage has a number of characteristics, including a high proportion of mortars and pestles relative to projectile points, that clearly indicate affiliation with the Berkeley pattern.

Upper Archaic/Emergent Period Transition

Components dating to the last part of the Upper Archaic and first part of the Emergent period (1500 to 700 B.P.) were not well defined. Napa Valley obsidian-hydration readings ranging from 3.1 to 2.2 microns (1470 to 740 B.P.) were obtained from most of the excavated sites, providing widespread evidence for use of the project area during this time period. Assemblages dated to the Upper Archaic/Emergent transition were identified at CCO-458 East, -459, -636, and -696 East. Radiocarbon dates of 1540 cal B.P. (CCO-636), 1320 cal B.P. (CCO-696 West), and 1265 cal B.P. (CCO-459) are indicative of this time period. Although the lack of a demonstrable assemblage from the Upper Archaic/Emergent period makes a definite cultural-historical assignment impossible, several ventrally extended burials identified at CCO-696 appear to postdate approximately 1300 B.P. This distinctive burial posture is a marker trait for the Meganos aspect of the Berkeley pattern (Bennyhoff 1994a:7).

Emergent Period

The Emergent period (1000 to 200 B.P.) was represented by components defined at three sites: CCO-468, -458, and -696 North. Assemblages dated to this time period were associated with both the Vaqueros paleosol and the more recent (less than 650 B.P.) Brentwood alluvium. Radiocarbon dates range from 690 to 250 cal B.P. with associated Napa Valley obsidian-hydration readings ranging from 2.5 to 1.0 microns (950 to 150 B.P.). Temporally diagnostic Stockton-series projectile points and *Olivella* and clam-shell disk beads link these components to the Augustine pattern.

SETTLEMENT AND SUBSISTENCE

Based on a hypothetical reconstruction of resource availability, limited chronological information for the project area, and survey data, Fredrickson postulated that the reservoir portion of the project area was within the catchment of a major Emergent-period tribelet, whose principal village was possibly located to the northwest. He also noted that buried sites, or older components of known sites representing different adaptive strategies related to earlier prehistoric occupations, might be present in the project area (SSUAF 1994b:5). The original research questions directed at this issue are:

> *Was the Kellogg Creek watershed occupied seasonally, year round, or only for short-term, resource-specific procurement?*
>
> *Is there variability in site types within the Kellogg Creek watershed over time that would indicate shifting adaptive strategies? Subsets of this question include the following:*
>
> > *a. Will archaeological sites contain low diversity of materials and tool types reflective primarily of the procurement and processing of plant materials and secondarily of activities, such as tool maintenance, related to hunting?*
> >
> > *b. Will Archaic Period sites (if found) be task specific with low constituent diversity?*
> >
> > *c. Will upland Archaic sites occur less frequently than Emergent Period sites?*

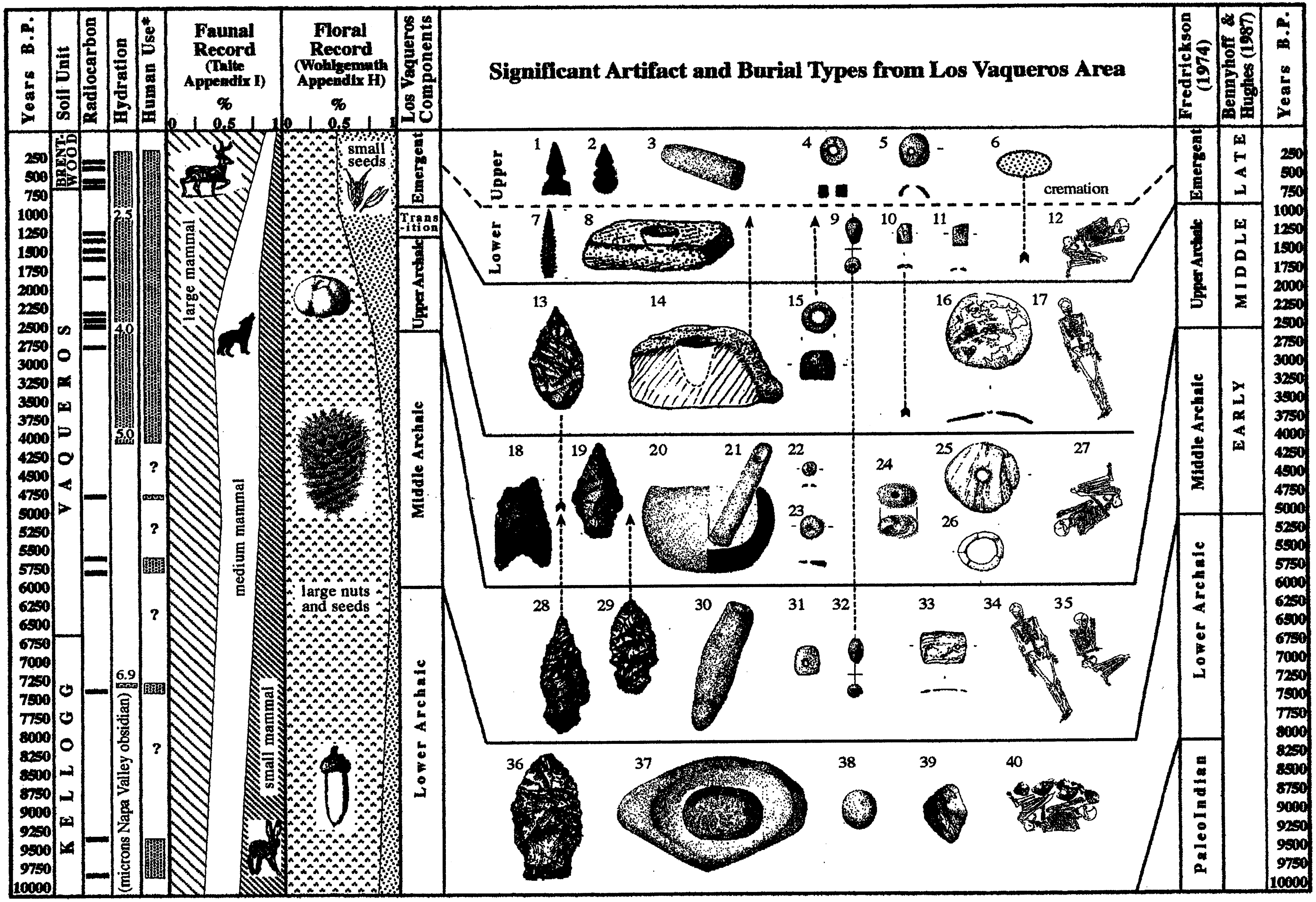


Figure V.4. Temporal Sequence for Cultural Assemblages from the Los Vaqueros Area. Approximate timing and duration of human use in the project area based on combined radiocarbon and obsidian-hydration evidence. (Note: Relative scale attempted within but not between artifact classes.)

Key to Figure V.1

No.	*Description*
1	Panoche Side Notched and Desert Side Notched projectile points made primarily of cryptocrystalline rock
2	Stockton Side Notched and Corner Notched projectile points made only of obsidian
3	Small cylindrical pestles
4	Clamshell disk beads
5	Lipped *Olivella* beads, Type E
6	Cremation of human remains
7	Stockton stemmed projectile points made only of obsidian
8	Small block mortars
9	Spire-lopped *Olivella* beads, Type A1b
10	Thin rectangular *Olivella* beads, Type M1
11	Thin rectangular *Olivella* beads, Type M2
12	Tightly flexed burials with variable orientations
13	Shouldered lanceolate projectile point made of obsidian
14	Bedrock mortars (Upper Archaic-period cups larger than Emgerent-period cups)
15	Steatite beads
16	*Haliotis* ornaments, Type CA4fm
17	Ventrally extended burials, primarily with northern orientation
18	Concave-base projectile points made of chert and obsidian
19	Contracting-stem projectile point made of chert
20	Shaped and cobble bowl mortars
21	Shaped and cobble pestles
22	Saucer *Olivella* beads, Types G1 and G2
23	*Macoma* clamshell disk beads
24	Split *Olivella* beads, Type C
25	*Haliotis* ornaments, Type C1C
26	*Haliotis* ornaments, Type C2C
27	Tightly flexed burials, primarily with southwest orientation
28	Side-notched projectile point made of chert (CCO-637, Burial 7, 5795 cal B.P.)
29	Side-notched projectile point made of chert (CCO-637, Burial 5, 5665 cal B.P.)
30	Cobble pestles with convex parabolic end-wear
31	Thick rectangular *Olivella* beads
32	Spire-Lopped *Olivella* beads, Type A1a
33	*Haliotis* ornament, Type uBA7
34	Fully extended and semi-extended burials primarily with northwest orientation
35	Loose-flexed burials, primarily with northwest orientation
36	Wide-stem projectile point made of obsidian (CCO-696, 6.9 microns Napa Valley)
37	Millingslabs and oval bifacial handstones
38	Small round handstones
39	Cobble-core tools
40	Cairn burial (CCO-696, Burial 160, 7400 cal B.P.)

d. Will Lower Emergent Period sites be predominantly task specific with low artifact diversity and fewer small, possibly seasonal, camp sites?

e. Is there more intensive use of the Los Vaqueros area during the Upper Emergent Period? For any given period, how does subsistence and settlement in the Kellogg Creek watershed compare with the San Ramon Creek and Alamo Creek watersheds?

Several lines of evidence, including site characteristics, features, and artifact and ecofact assemblages provide insight into the organization of settlement-subsistence activities within the project area. These data are reviewed with the intention of illuminating general trends in the nature and variability of prehistoric adaptations over time; they are summarized in Figure V.1.

Due to the potential effects of the project, our study was confined to the lowland portions of the Kellogg Creek watershed. With the exception of CCO-459 and -469, all of the sites were located in the valley bottom, adjacent to Kellogg Creek or a seasonal tributary, with the most extensive deposits located along the modern and former creek banks near the narrow northern end of the valley.

Lower Archaic

Deposits dating to the Lower Archaic were identified within the early-Holocene floodplain of Kellogg creek (i.e., Kellogg paleosol), adjacent to the former creek channel. Due to the depth of the deposit, the total area sampled was quite limited, particularly in the West Locus of CCO-696. A 4- x 8-meter exposure placed in the West Locus was relatively productive, however, producing a cache of handstones, a wide-stem projectile point, and various large cobble-core tools. The general site matrix contained numerous sandstone cobbles, traces of freshwater mussel, and moderate to low densities of faunal material. To the north (CCO-696 North), material dating to the Lower Archaic was widespread within the paleosol, composed primarily of dispersed faunal material and an occasional core or core tool. A single projectile point and an isolated human burial were also found in the North Locus.

Based on the archaeobotanical and archaeofaunal collections from the Lower Archaic component, resources in the immediate vicinity of the site appear to have been targeted, particularly those associated with the grassland-savanna. Acorn, wild cucumber, and manzanita dominated the floral assemblage, while large (artiodactyl) and small (rodentia) mammals made up the majority of the recovered faunal remains.

The functional artifact assemblage from the Lower Archaic suggests that a variety of tasks were carried out. Milling equipment, made up exclusively of handstones and millingslabs, appears to have been used to process large taxa (e.g., acorns and wild cucumber) rather than small seeds—a finding that stands in contrast to commonly held beliefs regarding millingtool-resource associations (cf. Basgall 1987). The large cobble-core tools recovered from the Lower Archaic component may have also been associated with plant collection or some other heavy processing tasks. Given the large projectile points and biface fragments, the occurrence of large mammal bone was not unexpected; the relatively high frequency of small mammal remains, however, suggests that other hunting technologies were also employed, such as traps, snares, and/or nets.

The long-term, periodic use of the valley during the Lower Archaic is reflected by the variance in radiocarbon dates and the sparse artifact and ecofact assemblage, as well as by the caching of artifacts with the expectation of a return visit. The dominance of late-summer- and fall-ripening floral remains may indicate only short-term seasonal use, probably associated with a highly mobile adaptation.

Middle Archaic

The earliest well-developed deposit, dated to the Middle Archaic, was located at CCO-637 within an alluvial fan adjacent to Kellogg Creek. Continued aggradation of the fan during the Middle Archaic provided a certain amount of vertical structure to the archaeological deposit. Although not well differentiated, it appears that at least two occupational strata were present, represented by a combination of intact features, burials, and broad horizons of debris (i.e., fire-affected rock, broken tools, and so on), probably accumulated as a result of repeated occupations over a long time span. At least three burials and several artifacts found deep within the Bkt Horizon of the Vaqueros paleosol at CCO-696, indicate that initial use of that site also occurred during the Middle Archaic.

In contrast to the earlier time period, occupation during the Middle Archaic appears to have been relatively intensive. The functional assemblage included a wider range of tools, as well as non-utilitarian artifacts. The several residential and processing features, along with the 21 human burials, are consistent with extended occupation.

Plant remains recovered from the Middle Archaic component at CCO-637 indicate an increased focus on upland species, primarily manzanita and gray pine, as well as continued use of wild cucumber and acorn. Similar to the Lower Archaic, very few small seeds are represented. In contrast to the plant remains, the faunal assemblage shows an emphasis on species probably taken in the lowlands, including large (artiodactyls) and medium-sized (carnivores) mammals. In addition, the remains of small freshwater minnows were also recovered from CCO-637. Combined, these data indicate that a much wider array of resources and habitats were being exploited than during the preceding period.

Mortars and pestles, which were recovered from the Bkt horizon of the Vaqueros paleosol and from soil Unit I at CCO-637, appear to have been the primary milling equipment used after approximately 6,000 years ago. Based on the floral remains, it seems that these tools were used to process a variety of nut and berry crops. The numerous large cobble-core tools and battered cobbles are also indicative of heavy processing activities. Dart-sized, side-notched points from Middle Archaic contexts suggest that the dart and atlatl may have been the primary hunting implements.

The temporal variation in radiocarbon dates, obsidian-hydration values, and the vertical and horizontal distribution of burials and features at CCO-637, are consistent with episodic use of the site throughout the Middle Archaic period. The sparse, but functionally varied, artifact and feature assemblages combined with the diverse floral and faunal remains are congruent with residential occupation. The paucity of small seeds in the floral assemblage probably indicates seasonal use of the site, most likely during the summer and fall.

Upper Archaic

The primary Upper Archaic deposit, located at CCO-696 West, was associated with the Vaqueros paleosol. During the time span in which the site was occupied, two former channels of Kellogg Creek bordered the east and west sides of the site, creating a narrow peninsula. The archaeological deposit was composed of a broad occupation stratum that varied considerably from east to west. Due to the long-term stability of the paleosol, the primary deposit was composed of an undifferentiated horizon of habitation debris, features, and human burials that apparently resulted from continued occupation of the site over an extended period of time.

While the composition of floral and faunal assemblages from the Upper Archaic are similar to that of the Middle Archaic, some important transitions appear to have taken place. The plant residue, while continuing to incorporate acorn, manzanita, wild cucumber, and gray pine, includes a much higher frequency of small-seed resources, as well as the highest frequency of buckeye in the sequence. Compared to the Lower and Middle Archaic assemblages, the overall composition of the floral assemblage suggests that additional habitats—such as moist slopes and canyons—were regularly exploited, and that the site was occupied over a wider range of seasons. With respect to the faunal material, the Upper Archaic assemblage includes a lower frequency of large mammal bone and a higher frequency of medium mammal bone when compared with earlier and later time periods.

Identified fish remains continue to reflect exploitation of a narrow range of species, primarily the resident freshwater minnows.

The Upper Archaic component at CCO-696 West produced numerous mortars and pestles, as well as a variety of other processing tools, including cobble-core tools, battered cobbles, and a variety of pecked, polished, and groundstone implements. Projectile points continued to be rare, represented by a variety of types. Bone tools and nonutilitarian artifacts were more frequent than in earlier assemblages, probably reflecting a wider range of site activities.

The numerous features—including baked clay and rock hearths, work areas, storage pits, and possible post holes—combined with other findings, such as the baked-clay daub used in house construction and more than 160 human burials, suggest that CCO-696 functioned as a residential base during the Upper Archaic. That the site was regularly occupied or re-occupied by the same group is reflected by the high number of burials that conformed to strict patterns of body position, orientation, and spatial distribution within the deposit. The radiocarbon dates and obsidian-hydration readings from this component are also consistent with long-term use.

Upper Archaic/Emergent Period Transition

Although archaeological deposits representing the last part of the Upper Archaic and first part of the Emergent period were widespread within the valley, most sites/loci assigned to this time span were poorly developed. Hydration evidence indicates that CCO-696 West and East were both used during this time span, as was CCO-637, -636, -458 East and West, and -459. For the most part, these deposits were quite sparse, generally lacking diagnostic artifacts, but frequently containing intact features and groundstone. The relative paucity of cultural material, combined with the distribution of obsidian-hydration readings and radiocarbon dates, is indicative of short-term, periodic use over a relatively long time span.

The widespread, yet poorly defined, occupation evidence may reflect a shift in land-use patterns. Although several extended burials recovered from CCO-696 appear to be associated with this time period, no clear residential base was identified. These deposits were more characteristic of brief occupations, probably associated with seasonal resource acquisition and processing. Consistent with this hypothesis, stratigraphic evidence from CCO-459 indicates that bedrock mortars came into use during this time period, approximately 1,600 to 1,300 years ago. This date is earlier than that hypothesized for bedrock milling stations in the western Sierra foothills and uplands, where milling stations may have first appeared around 1,000 years ago or later, but did not become widespread until ca. 500 B.P. (Moratto 1984:300, 303, 317).

Emergent Period

Evidence for Emergent-period occupation was identified in both the Vaqueros paleosol and the Brentwood alluvium. A discrete component found in the North Locus of CCO-696 was radiocarbon-dated to 690 B.P. Shortly after this date, a major episode of deposition occurred in the valley, creating the Brentwood deposit and burying the Vaqueros paleosol and associated Lower Emergent-period component at CCO-696 North. Following this event, occupation resumed or continued at CCO-458 West. Additional evidence for Emergent-period occupation comes from CCO-459, -468, and -636. The nature of these sites varied considerably, from extensive subsurface deposits containing a wide range of habitation debris, to sparse near-surface accumulations composed primarily of groundstone/bedrock milling stations and stone flaking debris and artifacts.

Characteristics of Emergent-period deposits indicate another major shift in the valley's use. A residential base was established at CCO-458, as indicated by a variety of features, including human burials, refuse pits, fire hearths, and a house floor. More stone-tool manufacturing occurred on site, while food-processing activities continued at isolated bedrock milling stations, such as CCO-459, -468, and possibly -469.

Based on plant remains, it appears that a wider variety of habitats were utilized than before, with increasing use of moist canyons and slopes, riparian zones, and seasonal wetlands. The use of locally available small-seed resources increased dramatically, with a simultaneous decline in the use of more distant, upland resources, supporting the notion of more sedentary occupation. In addition, the plant remains suggest that occupation occurred during a fuller range of seasons. The faunal assemblage includes an increased frequency of large mammal remains. A wider variety of fish species are represented, including anadromous salmon and sturgeon, as well as a greater diversity of resident freshwater species. While deposits associated with all time periods contained freshwater mussel shell, only the Emergent-period sites CCO-458, -459, and -468, contained marine shellfish. As only trace amounts of these marine species were identified, they probably did not account for a major part of the diet.

The radiocarbon and hydration information from the North Locus of CCO-696 suggests that the bow and arrow was in use by at least 690 B.P. This technology may have been more effective than the atlatl in hunting large mammals, a situation that may account for the increased frequency of these species in Emergent-period deposits. It also appears that the size of the milling equipment decreased in the Emergent period. Virtually all of the mortars recovered from these deposits had small cups (less than 61 mm in depth), with most characterized as small block mortars. A similar progression from large to small cups was recognized in the bedrock mortars. Those mortar cups recorded at CCO-468, an exclusively late-period deposit, were all of the small type, while bedrock mortars recorded at CCO-459, an upper Archaic/Emergent-period deposit, included both large and small forms. The stratigraphic relationship of the mortar cups at CCO-459 was also consistent with this sequence: the small cups were all exposed at the surface, while only the large cups had been buried, by up to 1 meter of sediment. It appears that the shift in the size of mortars may be related to an increased reliance on small-seed resources during the Emergent period.

Summary

The long sequence of human occupation and complex changes in settlement-subsistence patterns identified within the lowland portions of the Los Vaqueros Reservoir area were initially unexpected. Rather than a linear temporal progression of increasing sedentism and intensified land use, the evidence from Los Vaqueros provides a much more variable and complex picture.

The earliest identified use of the valley, during the Lower Archaic, appears to have been associated with a forager-type adaptation, where frequent residential moves accommodated fluctuations in the temporal–spatial availability of various faunal and floral resources (Binford 1981). The sparse, yet diverse, Lower Archaic assemblage indicates relatively short-term seasonal, and probably sporadic, occupation, focusing on resources in the immediate site vicinity.

While occupation during the Middle Archaic may have also been seasonal, the overall assemblage is indicative of a more logistically organized adaptation. A residential base camp located along Kellogg Creek appears to have served as a staging area for the procurement and processing of distant upland nut and berry crops. Sites in the Los Vaqueros Project area probably served as seasonal camps related to more substantial settlements located outside of the project area, perhaps to the east in the Central Valley–Delta region.

During the Upper Archaic, it appears that residential use of the valley was extended to include a fuller range of seasons. The presence of pits, assumed to represent storage facilities, attest to the growing importance of stored resources. Logistical forays continued into the adjacent uplands, while at least one small, permanent or semipermanent village/hamlet was established in the valley bottom.

Occupation during the Upper Archaic/Emergent period transition appears to represent a shift in the duration of habitation and nature of subsistence activities carried out within the valley. Relatively sparse assemblages found at various locations are consistent with periodic resource procurement and processing. While site CCO-696 may have occasionally served as a residential base camp, the task-

specific sites, including bedrock milling stations, were probably part of a logistically organized settlement-subsistence system, associated with more permanent villages located outside of the valley.

Long-term residential occupation of the Los Vaqueros Project area was reestablished during the Emergent period. A small year-round hamlet appears to have served as the primary locus of occupation, with continued resource procurement and processing at various locations within the Kellogg Creek drainage. Intensified use of resources associated with the oak-savanna and other nearby habitats suggests that foraging distances may have been reduced.

Discussion

For the most part, data recovered during the Los Vaqueros Project parallel the findings from other nearby valleys located in the interior Diablo Range. Although no other Lower Archaic component has been identified, reported Middle and Upper Archaic assemblages are quite similar to those from Los Vaqueros. In the Walnut Creek, San Ramon, and Livermore drainages, Archaic-period sites have primarily been identified in riparian habitats and characteristically contain human burials and residential features. Mortars and pestles are the only milling tools previously recorded from the region, found in Middle Archaic through Emergent-period deposits. Locally available tool stone predominates during the Archaic, with low frequencies of obsidian from both Eastern Sierra and North Coast Ranges sources. Mammal exploitation appears to have been divided between small, medium, and large species, with slightly higher frequencies of medium mammals during the Upper Archaic, and larger mammals (predominantly deer) during the Emergent period (Banks, Orlins, and McCarthy 1984; Fredrickson 1966, 1968; Heizer 1950; Wiberg 1996).

Consistently, Emergent-period sites in the region have yielded increased amounts of marine fish and shellfish remains, as well as other exchange items, such as obsidian from the North Coast Ranges (Baker 1987; Fredrickson 1968; Wiberg 1996). Recovered floral assemblages from Emergent-period deposits provide regional evidence of intensified/extensified use of floral resources—predominantly small seeds (Wohlgemuth 1996).

INTERACTION AND EXCHANGE

According to the research design in the second HPTP (SSUAF 1994b:7), a primary marker trait of the development of a regularized exchange system—indicating a change from an Archaic foraging strategy to a collector strategy—is the shift in obsidian use between the Upper Archaic and the subsequent Lower Emergent periods. Tracking obsidian use has therefore become of focus of interaction and exchange research. Questions relating to interaction and exchange in the HPTP are as follows:

What is the temporal, geographic, and source variability of obsidian in the Los Vaqueros area? Subsets of this question include the following:

a. Is obsidian rare to absent in Archaic Period sites?

b. If obsidian occurs in the Archaic Period, will it be limited to formal artifacts, broken artifacts, and small flakes indicative of maintenance and repair?

c. Given sufficient sample size, will the obsidian in Archaic Period sites have relatively high source variability?

d. Will obsidian debitage found at surface sites within the Kellogg Creek watershed date to the Emergent Period and exhibit low source variability?

e. How does obsidian use in the Kellogg Creek watershed compare with obsidian use in the San Ramon Creek and Alamo Creek watersheds?

f. Is obsidian use in the Los Vaqueros Project area indicative of regularized exchange during the Emergent Period and ad hoc exchange during the Archaic Period, as observed elsewhere in Contra Costa County?

What is the temporal, geographic, and source variability of other exotic materials in the Los Vaqueros area?

Nonlocal obsidian was identified in components dated as early as the Lower Archaic. Even at this time depth, exchange ties may have been far reaching. Obsidian flakes and artifacts recovered from the Kellogg paleosol included specimens from the Napa Valley and Annadel sources in the North Coast Ranges and from the Bodie Hills source in the eastern Sierra. Unfortunately, obsidian-hydration analysis failed to confirm the antiquity of most samples; only a wide-stem projectile point of Napa Valley obsidian could be unequivocally dated to the Lower Archaic period. During the Middle Archaic, obsidian was generally rare in the project area, but specimens from both the North Coast Ranges (Napa Valley) and eastern Sierra (Bodie Hills and Casa Diablo) sources were identified. Based on the low frequency of flaking debris relative to tools, it appears that during both the Lower and Middle Archaic, obsidian was acquired in the form of finished artifacts. This pattern of source variability and form of acquisition appears to have continued through the Upper Archaic period.

Judging from the high number and spatial distribution of hydration rim values associated with the Upper Archaic/Emergent transition, obsidian use and discard in the valley appears to have increased, suggesting greater access to this material. During that time period, there appears to have been a greater reliance on obsidian from the North Coast Ranges—including material from the Borax Lake source—and a concomitant decline in the use of material from the eastern Sierra. These changes may have resulted from a breakdown in extraregional exchange or they may represent use of the valley by a different cultural group that was better integrated within the North Coast ranges exchange network.

During the Emergent period, a significant shift in the frequency and form of obsidian acquisition appears to have taken place. By that time period, obsidian was imported in the form of cobbles and minimally modified flake blanks, originating exclusively from the Napa Valley source.

Marine-shell beads and ornaments formed another category of exchange items frequently found in the Los Vaqueros Project area. The oldest shell-bead lot from the project area, and one of the earliest well-dated bead lots from central California, is that from Burial 14 at CCO-637, associated with a radiocarbon date of 4770 B.P. This Middle Archaic burial produced more than 1,000 *Olivella* shell beads. A second burial dating to the Middle Archaic produced 22 rectangular, end-perforated, *Haliotis* ornaments. By far the highest frequency of shell beads and ornaments occurred during the first part of the Upper Archaic, dating between approximately 2300 and 1800 B.P. Close to 5,000 shell beads and 21 ornaments were associated with this time period. Only a handful of marine-shell artifacts were found to date to the latter part of the Upper Archaic and Upper Archaic/Emergent-period transition. During the Emergent period, shell beads were relatively common, frequently found in the midden at CCO-458 and with one burial at CCO-696 North. Fragmentary *Olivella* shells representing manufacturing debris indicate that, by the Emergent period, at least some of the beads were probably manufactured on site.

With respect to the form of acquisition, the beads and ornaments associated with the Middle Archaic were found in patterned arrangements, suggestive of decorated clothing. In the Upper Archaic, beads and ornaments continued to be used as decoration on garments and appear to have also been strung. The large quantity and uniformity of beads dating to the Upper Archaic indicate that they were probably manufactured systematically en masse and acquired via exchange, possibly serving as

items of fixed value. Clearly, by the Upper Emergent period, ethnographic accounts indicate that the clam-shell disk beads, like those from CCO-458, functioned as currency (King 1978:59).

While the patterns of obsidian and marine-shell artifact exchange are parallel to some degree, clear differences exist, indicating that the two exchange networks may have been unrelated. Obsidian increased in frequency, particularly from the late Upper Archaic through the Emergent period, while the frequency of marine-shell artifacts found with burials peaked during the early Upper Archaic and apparently declined thereafter. These patterns generally agree with the findings from other nearby valleys, where high frequencies of shell beads are found with Upper Archaic burials (Wiberg 1988, 1996; Milliken and Bennyhoff 1993), but increased obsidian use does not occur until the Emergent period (Bieling 1996; Fredrickson 1969; Jackson 1974).

In the second HPTP research design (SSUAF 1994b:6), Fredrickson drew on the work of Y. Cohen (1970, 1975); he posited that by monitoring the parallel development of exchange systems and social differentiation based on wealth, it should be possible to identify the shift to a collector-type foraging strategy, where administrative roles are well defined. Based on data from the San Ramon Creek and Alamo Creek watersheds, it was hypothesized that this shift would be marked by increased obsidian use during the Emergent period. At Los Vaqueros, however, shell beads appear to have been the first regularly exchanged items, first appearing in large quantities during the Middle Archaic period. Special grave preparation and the presence of over one thousand shell beads with the Middle Archaic-period burial mentioned above, indicate that status differences probably already existed by 4700 B.P. Although other data suggest that a logistically organized settlement-subsistence system was in place by the Middle Archaic, more regularized shell-bead exchange and extended residential use of the valley developed during the Upper Archaic. Clear status differences are indicated by the presence and variability of grave goods found with Upper Archaic burials. It is these changes, during the Upper Archaic, that correlate with an apparent increase in sedentism and logistically organized subsistence practices indicative of a collector-type foraging strategy. Increased obsidian acquisition and use during the Emergent period appears to represent the development and elaboration of regional exchange systems, probably associated with increased extraterritorial food acquisition (e.g., marine fish and shellfish) and better-defined administrative roles.

LANDSCAPE EVOLUTION

The alluvial landforms in the upper Kellogg Creek valley were examined as part of the subsurface survey to determine their age, nature, and extent. Five major chronostratigraphic units were identified on the basis of distinct vertical and horizontal discontinuities as marked by erosional surfaces and buried paleosols. Radiocarbon and stratigraphic evidence were used to establish the age and depositional sequence of the units as follows: Pleistocene (late Pleistocene), Rincon (early to mid-Holocene), Kellogg (early Holocene), Vaqueros (mid-Holocene), and Brentwood (late Holocene). Four of the units (Pleistocene, Rincon, Kellogg, and Vaqueros) exhibited well-developed soil profiles indicative of a relatively long period of near-surface weathering on stable landforms. In contrast, the Brentwood unit exhibited a weakly to moderately developed soil profile indicative of a relatively short interval of near-surface weathering on a stable landform. Three of these units (Pleistocene, Kellogg, and Vaqueros) were buried, and the remaining units (Rincon and Brentwood) were exposed at the surface in the northern part of the reservoir area. The Rincon unit was found to be associated with the gently sloping alluvial fans around the edges of the valley, while the Brentwood unit was found to be associated with the nearly level floodplain in the central parts of the valley.

Based on the results of the subsurface survey, the history of landscape development in the upper Kellogg Creek valley has been reconstructed for certain periods of time. During the late Pleistocene (15,000 to 11,000 B.P.), a series of relatively stable alluvial-fan deposits sloped toward the center of the valley. As the Kellogg Creek channel migrated back and forth across the central part of the valley, portions of these fans were removed by erosion, creating an entrenched channel. The entrenched section began to fill with sediments, creating an inset floodplain around 11,000 B.P., as the stream

became unable to transport all of the eroded sediments. By 10,000 years ago, the entrenched section had become partially filled with alluvium that formed an inset floodplain identified as the Kellogg unit. About this time, the Pleistocene alluvial fans around the margins of the valley began to be covered by the slow but steady deposition of new alluvial-fan deposits that form the Rincon unit. During the early Holocene (10,000 to 7000 B.P.), the Kellogg unit formed a relatively stable floodplain that was occupied by prehistoric people and incised by the channel of Kellogg Creek along the western part of the valley. Between 7000 and 6600 B.P., the active channel was again choked with sediments that eventually spread out across the central part of the valley and buried the Kellogg floodplain. By about 6600 B.P., these deposits formed a newly inset floodplain identified as the Vaqueros unit.

During the middle and late Holocene, the Vaqueros unit formed a relatively stable floodplain that was occupied by prehistoric people and incised by two separate stream channels. Dated fragments of wood preserved in the easternmost channel indicate that it was a deeply entrenched stream prior to 2300 B.P. After that time, both the eastern and western channels began to fill with sediments. By about 650 years ago, sediment began to spill over the banks of the western channel and onto the valley floor. This episode of alluvial deposition buried the eastern channel and the Vaqueros floodplain, resulting in the formation of the Brentwood unit. Some time after about 300 years ago, the western Kellogg Creek channel began to downcut through the portions of the Brentwood, Vaqueros, and Kellogg units, again creating a deeply incised channel. The Brentwood floodplain was eventually abandoned as the stream became better able to transport sediment out of the valley. Since then, land stability and soil formation have dominated the Brentwood floodplain up to the present.

Comparisons indicate that the sequence of alluvial deposits in the upper Kellogg Creek valley is similar to that found in other valleys in the region. Archaeological and geological studies in Contra Costa County and the San Joaquin Valley demonstrate that valleys were partially filled with alluvium by three or more cycles of deposition that were separated by periods of land stability and soil formation (Banks, Orlins, and McCarthy 1984; Lettis 1982; Marchand and Allwardt 1981; Meyer 1996b; Pape 1978; Rogers 1988). Based on stratigraphic and radiocarbon evidence, one cycle occurred during the late Pleistocene, while two to five cycles occurred during the Holocene. In Contra Costa County, distinct episodes of alluvial filling are recorded during the early, middle, and late Holocene. While there is slight variation in the exact timing of these episodes, the sequence of alluvial deposition is roughly synchronous among separate valleys. The apparent correspondence between the timing of the stratigraphic record and the climatic record (see Figure II.4) indicates that large-scale environmental changes may have been responsible for alternations between stable and unstable landscape processes. These findings suggest that the cyclic deposition of alluvium in these valleys is the geomorphic expression of large-scale environmental changes that occurred throughout the region during the past 15,000 years.

CONCLUSION

SUMMARY

Archaeological and geoarchaeological investigations in the Los Vaqueros Project area have revealed a long and complex record of prehistoric human occupation that spans almost 10,000 years. The Lower Archaic component associated with the Kellogg unit at CA-CCO-696 represents the oldest well-dated evidence of human occupation (9800 to 9400 B.P.) and human remains (7400 B.P.) yet identified in any of the counties that border San Francisco Bay. In addition, one of oldest shell-bead lots (4770 cal B.P) in central California was found in association with Burial 14 at CCO-637. The antiquity of these remains extends the range of human occupation back some 4,000 to 5,000 years earlier than previously documented for the area. Despite some expectations that the Los Vaqueros area would have been a marginal environment for human use and settlement prior to the Emergent period, these investigations found that permanent or semi-permanent residential bases were already established in the lowlands more than 2,000 years ago.

Other findings include significant technological changes in groundstone assemblages over time. As a product of the detailed chronostratigaphic sequence developed during the project, we were able to provide relatively accurate estimates for the introduction of various milling technologies. Handstones and millingslabs associated the Kellogg paleosol appear to have been used prior to approximately 6600 B.P., while mortars and pestles were used exclusively thereafter. Based on stratigraphic evidence, it was concluded that bedrock milling stations were first established between 1600 and 1300 B.P. Changes observed in the size of bedrock and portable mortar cups over time indicated that larger cups were associated with the last part of the Upper Archaic period, while smaller cups were associated with the Emergent period.

Interestingly, the shift from the handstone and millingslab to the mortar and pestle was not reflected by changes in the composition of the floral assemblages; acorns and other large seeds and nuts (i.e., manzanita and grey pine) appear to have been the dominant floral resources processed with these tools throughout the Archaic period. Only during the Emergent period is there evidence for corresponding shifts in milling technology and changes in the composition of associated floral assemblages. During that time period, a reduction in the size of portable and bedrock mortar cups paralleled an increase in the amount and diversity of small seeds found in the same deposits.

In general, findings from the Los Vaqueros Project have added significantly to our understanding of the way in which landscape evolution during the late Pleistocene and Holocene has affected our ability to identify and sample archaeological deposits of different ages in the lowlands of central California. In addition, the archaeological record identified at Los Vaqueros constitutes one of the longest sequences of human occupation yet identified in a single locality in the broader San Francisco Bay–Delta region.

Summarized below are some of the most distinctive characteristics of each major time period represented at Los Vaqueros.

During the Lower Archaic, approximately 10,000 to 6000 B.P., available evidence indicates that

- there was high residential mobility
- resources of the grassland-savanna were targeted
- technology was relatively expedient, and both seeds and nuts were processed with the handstone and millingslab
- obsidian from the North Coast Ranges and possibly the Eastern Sierra was used.

During the Middle Archaic, approximately 6000 to 2500 B.P,

- residential mobility had decreased and there were base camps established in the valley
- plant resources from the nearby uplands were emphasized
- mortars and pestles were used exclusively from the beginning of this period
- burial associations of shell ornaments and shell beads occurred, perhaps signaling the emergence of social distinctions based on wealth
- obsidian from the North Coast Ranges and eastern Sierra sources continued to be used.

During the Upper Archaic, approximately 2500 to 1500 B.P.,

- residential mobility decreased and fixed villages were established
- plant resources from both the uplands and grassland–savanna were emphasized, with an increased use of small seeds
- the presence of numerous uniformly made shell beads and ornaments with burials indicates that exchange relationships had become more important.

During the Upper Archaic/Emergent-period transition, approximately 1500 to 700 B.P.,

- there was a shift in burial practices and land-use patterns
- bedrock milling stations were established by at least 1300 years ago
- more locations in the valley were occupied, but assemblages were more characteristic of brief occupations, probably associated with resource acquisition and processing
- obsidian use increased from earlier periods, but other exchange items were absent.

By the Emergent period, approximately 1000 to 200 B.P.,

- fixed villages were reestablished
- there was a dramatic increase in the use of grassland-savanna small-seed resources and a simultaneous decrease in the use of upland nut and berry crops
- bedrock milling stations continued to be used for bulk processing
- obsidian use increased, associated with the importation of obsidian cobbles and minimally modified flake blanks, exclusively from the Napa Valley source.

To conclude, while there are a variety of significant findings from the Los Vaqueros prehistoric archaeological investigations, most important is the completeness of the record produced by a combined geomorphic/archaeological field strategy. The approach permitted the examination of the development of major dimensions of adaptation over a long span of human occupation.

As noted above, most synthetic and theoretical studies in central California to date have dealt with the latter one-third of the record—the past 4,500 years or so. The Los Vaqueros record provides a number of points of contrast with expectations developed from the more traditional (Early, Middle, Late-period) approach, and suggests that geomorphic approaches may result in revisions to the theoretical models developed for central California.

DIRECTIONS FOR FUTURE RESEARCH

The prehistoric archaeological investigations for the dam and reservoir construction have added significantly to our understanding of the timing and nature of human land use in the interior Diablo range. The geoarchaeological background research and field investigation has revealed that the visibility and preservation of the archaeological record in the lowlands of central California has been profoundly influenced by the processes of landscape evolution. These investigations of deeply buried archaeological deposits—warranted due to the large scale of construction impacts from dam construction—have found that the prehistoric record at Los Vaqueros is far more complex than envisioned when the HPTP was prepared and will no doubt be of interest to a relatively wide audience. Future HPTPs might include the provision for one or more publications on the area's prehistory for broader distribution. Possibilities include a volume for the general public, similar to those undertaken for the historical archaeology component under the dam and reservoir HPTP, and a collection of scholarly essays or special studies that more fully develop certain findings from the Los Vaqueros investigations.

Research questions for prehistoric archaeology, developed in 1992 prior to any subsurface exploration, have been addressed and reformulated in the current report. The next HPTP that addresses known or potential prehistoric archaeological sites should revise the prehistoric research design to reflect findings to date. For example, the archaeological and archaeobotanical investigations indicate that, during the Middle through Upper Archaic periods, locations on the valley floor served as base camps from which resources located primarily in the uplands were exploited. Future work, particularly in the hills surrounding the dam and reservoir, should address whether or not resource-procurement and processing sites dating to these time periods are indeed found in upland contexts. Pursuit of these

and similar questions might allow fuller characterizations of some of the less well-represented components in the valley.

While previous studies in the Kellogg Creek valley and vicinity have relied on obsidian-hydration results to provide chronological control (e.g., Bramlette 1989), the results of the current investigations indicate that Archaic-period sites in this area are relatively obsidian-poor. Obsidian-hydration dating, therefore, may not accurately reflect the full temporal range or intensity of human use at a particular site or in the region as a whole. While it should be possible to locate Archaic-period sites at or near the surface in the uplands due to a general lack of alluvial deposition in these locations, Archaic and earlier sites located in the valley bottom will only be found in one of the three paleosols or alluvial-fan deposits identified during the current project. Recognition of the fact that only certain landforms have the potential to contain archaeological deposits can lead to more productive investigations in the interior Diablo region. Ultimately, valuable regional comparisons may be possible once the full spectrum of prehistoric occupation in adjacent valleys has been archaeologically sampled. Future research may also clarify the causal mechanisms and ecological implications of landscape evolution and past environmental changes on human settlement and subsistence.

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APPENDIX A

SUMMARY OF EXCAVATION VOLUMES

Cubic Meters Excavated 1 of 4

CA-CCO-458

Surface Grid Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
N0/W60	1 x 1	6	0-20	0.2
N0/W90	1 x 1	6	0-20	0.2
N30/W0	1 x 1	6	0-20	0.2
N31/W30	1 x 1	6	0-20	0.2
N30/W60	1 x 1	6	0-20	0.2
N30/W90	1 x 1	6	0-20	0.2
N30/W120	1 x 1	6	0-20	0.2
N60/W0	1 x 1	6	0-20	0.2
N60/W30	1 x 1	6	0-20	0.2
N60/W60	1 x 1	6	0-20	0.2
N60/W90	1 x 1	6	0-20	0.2
N60/W120	1 x 1	6	0-20	0.2
N60/W150	1 x 1	6	0-20	0.2
N70/W130	1 x 1	6	0-20	0.2
N80/W120	1 x 1	6	0-20	0.2
N90/W0	1 x 1	6	0-20	0.2
N90/W30	1 x 1	6	0-20	0.2
N90/W90	1 x 1	6	0-20	0.2
N90/W120	1 x 1	6	0-20	0.2
N100/W110	1 x 1	6	0-20	0.2
N110/W80	1 x 1	6	0-20	0.2
N110/W100	1 x 1	6	0-20	0.2
N110/W130	1 x 1	6	0-20	0.2
N120/W0	1 x 1	6	0-20	0.2
N120/W30	1 x 1	6	0-20	0.2
N120/W60	1 x 1	6	0-20	0.2
N120/W90	1 x 1	6	0-20	0.2
N120/W120	1 x 1	6	0-20	0.2
N130/W80	1 x 1	6	0-20	0.2
N130/W100	1 x 1	6	0-20	0.2
N140/W70	1 x 1	6	0-20	0.2
N140/W110	1 x 1	6	0-20	0.2
N150/W0	1 x 1	6	0-20	0.2
N150/W30	1 x 1	6	0-20	0.2
N150/W60	1 x 1	6	0-20	0.2
N150/W90	1 x 1	6	0-20	0.2
N150/W120	1 x 1	6	0-20	0.2
N160/W80	1 x 1	6	0-20	0.2
N160/W110	1 x 1	6	0-20	0.2
N170/W100	1 x 1	6	0-20	0.2
N180/W0	1 x 1	6	0-20	0.2
N180/W30	1 x 1	6	0-20	0.2
N180/W60	1 x 1	6	0-20	0.2
N180/W90	1 x 1	6	0-20	0.2
N210/W0	1 x 1	6	0-20	0.2
N210/W30	1 x 1	6	0-20	0.2
N210/W60	1 x 1	6	0-20	0.2
N240/W0	1 x 1	6	0-20	0.2
N240/W30	1 x 1	6	0-20	0.2
N240/W60	1 x 1	6	0-20	0.2
N270/W0	1 x 1	6	0-20	0.2
N270/W30	1 x 1	6	0-20	0.2
N270/W60	1 x 1	6	0-20	0.2
N270/W90	1 x 1	6	0-20	0.2
N91/E30	1 x 1	6	0-20	0.2
N120/E30	1 x 1	6	0-20	0.2
N120/E60	1 x 1	6	0-20	0.2
N150/E30	1 x 1	6	0-20	0.2
N180/E30	1 x 1	6	0-20	0.2
N190/E20	1 x 1	6	0-20	0.2
N210/E30	1 x 1	6	0-20	0.2
N240/E30	1 x 1	6	0-20	0.2
			Total	12.4

Surface Transect Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
N176/E20	0.5 x 2	6	0-20	0.2
N184/E20	0.5 x 2	6	0-20	0.2
N194/E20	0.5 x 2	6	0-20	0.2
N198/E20	0.5 x 2	6	0-20	0.2
N202/E20	0.5 x 2	6	0-20	0.2
N210/E20	0.5 x 2	6	0-20	0.2
N180/E10	0.5 x 2	6	0-20	0.2
N186/E10	0.5 x 2	6	0-20	0.2
N192/E10	0.5 x 2	6	0-20	0.2
N198/E10	0.5 x 2	6	0-20	0.2
N204/E10	0.5 x 2	6	0-20	0.2
N210/E10	0.5 x 2	6	0-20	0.2
			Total	2.4

Test Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
N196/E20	1 x 2	6	0-70	1.4
N200/E20	1 x 2	6	0-80	1.6
N204/E20	1 x 2	6	0-70	1.4
			Total	4.4

Area Exposure Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
N126/W103	1 x 2	6	0-70	1.4
N126/W104	1 x 2	6	0-60	1.2
N126/W106	1 x 2	6	0-60	1.2
N126/W108	1 x 2	6	0-90	1.8
N126/W110	1 x 2	6	0-150	3.0
N124/W105	1 x 2	6	0-180	3.6
N124/W107	1 x 2	6	0-50	1.0
N124/W109	1 x 2	6	0-50	1.0
N122/W105	1 x 2	6	0-40	0.8
N122/W106	1 x 2	6	0-40	0.8
N122/W107	1 x 2	6	0-40	0.8
N122/W108	1 x 2	6	0-50	1.0
N122/W110	1 x 2	6	0-70	1.4
N120/W105	1 x 2	6	0-40	0.8
N120/W106	1 x 2	6	0-40	0.8
N120/W107	1 x 2	6	0-40	0.8
N120W108	1 x 2	6	0-40	0.8
N122/W104	1 x 2	6	0-40	0.8
			Total	23.0

Feature Exposure Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
N122.5/W109.5	0.5 x 0.5	6	0-60	0.15
N122/W109	0.5 x 0.5	6	0-60	0.15
N122.5/W110	0.5 x 0.5	6	0-60	0.15
N124/W107.5	0.5 x 0.5	6	0-100	0.25
N124.5/W107	0.5 x 0.5	6	0-100	0.25
N125/W105	1 x 1	6	0-50	1.00
			Total	1.95

Total	44.15

Cubic Meters Excavated 2 of 4

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Test Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS (cm)	Volume (m3)
N1.5/E5	1 x 2	6	0-60	1.2
Unit 1	1 x 1	6	0-30	0.3
			Total	1.5

Area Exposure Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS (cm)	Volume (m3)
N1/W0	1 x 2	-	0-70	1.4
S0/W0	1 x 2	6	0-90	1.8
S1/W0	1 x 2	6	0-40	0.8
S2/W0	1 x 2	6	0-45	0.9
S4/W0	1 x 2	6	0-60	1.2
N0/E5	1 x 2	6	0-20	0.4
S1/E5	1 x 2	6	0-30	0.6
S2/E5	0.8 x 2	6	0-10	0.16
S4/E5	2 x 2	6	0-30	1.2
			Total	8.46

BRM Exposure Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS (cm)	Volume (m3)
S4/W5	2 x 2	6	0-40	1.6
S5/W0	2 x 2	-	0-60	2.4
			Total	4.0

Backhoe Exposures

Unit	Units Size (m)	Mesh (mm)	Depth (BS (cm)	Volume (m3)
Exp. 1	2 x 5	-	0-40	4.0
Exp. 2	3 x 4	-	0-40	4.8
			Total	8.8

Total	21.26

CA-CCO-468

Surface Transect Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS (cm)	Volume (m3)
N0/W10	0.5 x 2	6	0-20	0.2
N0/W30	0.5 x 2	6	0-20	0.2
N0/W40	0.5 x 2	6	0-20	0.2
N0/W50	0.5 x 2	6	0-20	0.2
N0.5/W50	0.5 x 2	6	0-20	0.2
N0.5/W50	1 x 1	6	20-40	0.2
N0/W70	0.5 x 2	6	0-20	0.2
S10/W20	0.5 x 2	6	0-20	0.2
S10/W40	0.5 x 2	6	0-20	0.2
S10/W60	0.5 x 2	6	0-20	0.2
S10/W90	0.5 x 2	6	0-20	0.2
S10/W100	0.5 x 2	6	0-20	0.2
S10/W110	0.5 x 2	6	0-20	0.2
			Total	2.6

Test Unit

Unit	Units Size (m)	Mesh (mm)	Depth (BS (cm)	Volume (m3)
Unit 1	1 x 1	6	0-50	0.5
			Total	0.5

Area Exposure

Unit	Units Size (m)	Mesh (mm)	Depth (BS (cm)	Volume (m3)
N0/W0	1 x 2	6	0-30	0.6
N0/W1	1 x 2	6	0-30	0.6
N0/W2	1 x 2	6	0-30	0.6
			Total	1.8

Total	4.9

CA-CCO-636

Surface Transect Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
S10/W0	1 x 1	6	0-20	0.2
S20/W0	1 x 1	6	0-20	0.2
S20/E40	1 x 1	6	0-20	0.2
S20/E60	1 x 1	6	0-20	0.2
S30/W0	1 x 1	6	0-20	0.2
N0/E9	1 x 1	6	0-20	0.2
N0/W10	1 x 1	6	0-20	0.2
N10/W0	1 x 1	6	0-20	0.2
N10/W10	1 x 1	6	0-20	0.2
N10/W20	1 x 1	6	0-20	0.2
N20/W0	1 x 1	6	0-20	0.2
N40/W0	1 x 1	6	0-20	0.2
N50/W0	1 x 1	6	0-20	0.2
N60/W0	1 x 1	6	0-20	0.2
N60/W30	1 x 1	6	0-20	0.2
N80/W0	1 x 1	6	0-20	0.2
N80/W30	1 x 1	6	0-20	0.2
			Total	**3.4**

Test Unit

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
N13/W6	1 x 2	6	0-50	1.0
			Total	**1.0**

Feature Exposure

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
Feat. 1	4 x 5	6	0-50	10.0
			Total	**10.0**

Total	**14.4**

CA-CCO-637

Test Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
S20/W0	0.5 x 2	6	0-100	1
S10/W0	0.5 x 2	6	0-80	0.8
S50/W0	0.5 x 2	6	0-80	0.8
			Total	**2.6**

Subsurface Transect Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
S18/W1	0.6 X 4	6	60-80	0.48
S22/W1	0.6 X 4	6	60-80	0.48
S26/W1	0.6 X 4	6	60-80	0.48
S30/W1	0.6 X 4	6	60-80	0.48
S34/W1	0.6 X 4	6	60-80	0.48
S38/W1	0.6 X 4	6	60-80	0.48
S42/W1	0.6 X 4	6	60-80	0.48
S46/W1	0.6 X 4	6	60-80	0.48
S50/W1	0.6 X 4	6	60-80	0.48
			Total	**4.32**

Area Exposure Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
S27/W3	1 x 2	6	70-150	1.6
S29/W3	1 x 2	6	70-140	1.4
S31/W3	1 x 2	6	70-140	1.4
S33/W3	1 x 2	6	70-130	1.2
			Total	**5.6**

Backhoe Exposures

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
Area Exp.	2 x 8	-	0-70	11.2
T4-27-1	0.6 x 50	-	0-60	18.0
			Total	**29.2**

Total	**41.72**

CA-CCO-696

Test Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
S9/E9	2 x 2	6	70-100	1.2
S9/E18	2 x 2	6	0-80	3.20
S2.5/E22	2 x 2	6	0-70	2.80
S2.5/E25	2 x 2	6	0-80	3.20
S2.5/E28	1 x 2	6	0-90	1.80
			Total	**12.20**

Exposure Grid Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
N0/W5	2 x 2	6	60-120	2.40
N0/W2	2 x 2	6	60-130	2.80
S3/W5	2 x 2	6	50-110	2.40
S3/W2	2 x 2	6	50-90	1.60
S6/W2	2 x 2	6	50-90	1.60
S9/W2	2 x 2	6	50-100	2.00
			Total	**12.80**

Burial Exposure Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
S8/E9.5	1 x 1.5	6	60-90	0.45
S6/W0	1 x 1.5	6	60-90	0.45
S5/W2	1 x 1.5	6	50-90	0.60
S2/W1.5	1 x 1.5	6	50-80	0.45
			Total	**1.95**

Micro-Units

Unit	Units Size (m)	Mesh (mm)	Depth (BS) (cm)	Volume (m3)
M5S	0.5 x 0.5	3	50-90	0.20
M10S	0.5 x 0.5	3	40-120	0.40
M15S	0.5 x 0.5	3	30-120	0.45
M20S	0.5 x 0.5	3	30-120	0.45
M25S	0.5 x 0.5	3	30-120	0.45
			Total	**1.95**

Deep Exposure Units

Unit	Units Size (m)	Depth (BS) (cm)	Volume (m3)
NW-1	1.3 x 4	340-410	3.64
W-1	1.3 x 4	340-410	3.64
SW-1	1.3 x 4	340-410	3.64
NE-1	1.3 x 4	340-410	3.64
E-1	1.3 x 4	340-410	3.64
SE-1	1.3 x 4	340-410	3.64
		Total	**21.84**

Exposures

Exp.	Size (m)	Brentwood Depth (cm)	Vaqueros Depth (cm)	Brentwood Volume (m3)	Vaqueros Volume (m3)
1	7 x 33	0-50	50-160	115.5	239.4**
2	6 x 33	0-50	50-160	99.0	217.8
3	8 x 33	0-50	50-130	132.0	211.2
4	16 x 45	0-50	-	360.0	-
4	8 x 45	-	50-120	-	252.0
5	10 x 57	0-40*	40-160	228.0	684.0
6A	7 x 35	0-40	-	98.0	-
6A	4 x 35	-	40-100	-	84.0
6B	11 x 27	0-40	-	118.0	-
7	8 x 32	0-40	-	102.4	-
			Total	**1252.9**	**1688.4**
				Total	**2941.3**

* Average Depth

** Does not include Exposure Grid Units

APPENDIX B

PALEONTOLOGICAL INDENTIFICATION

APPENDIX B

PALEONTOLOGICAL IDENTIFICATION

The following are selected paleontological specimens from the Los Vaqueros Project area. The single asterisk (*) indicates that the specimen was found in an archaeological context, while the double asterisk (**) indicates that the specimen was found in a nonarchaeological context. Jack Meyer identified the bone and shell specimens, and Richard S. Dodd identified the wood specimens (see Appendix E).

General Identification	*Specific Identification*	*Number and Condition*	*Approx. Age*	*Site or Location*	*Catalog Number*
Fossil shell *	Gastropod *(Turritella uvasan aedificata?)*	1 complete	upper Eocene	CCO-458/H	95-2-1587
Fossil shell *	Oyster *(Ostrea bourgeoisii?)*	3 complete	upper Miocene	CCO-637	95-7-164
Fossil bone **	Large mammal Camel? (Camelidae)	27 longbone and tooth fragments, and 1 complete carpal	late Pleistocene	CCO-637	95-7-418
Unusual bone *	Large mammal Bison? (Bovidae)	1 fragment of cranium and horn core	Holocene	CCO-696	95-8-347
Unusual bone *	Large mammal Bison? (Bovidae)	1 fragment of cranium and horn core	Holocene	CCO-696	95-8-1860a
Mineralized antler **	Elk or deer (Cervidae)	1 antler fragment	early Holocene	Profile 5 Dam Footprint	95-12-6
Mineralized tooth **	Large carnivore Bear? (Ursidae)	1 tooth fragment	early Holocene	Profile 5 Dam Footprint	95-12-35
Fossil bone **	Large mammal ?	17 cranial fragments; 2 complete carpals; 1 partial vertebra	late Pleistocene	Profile 5 Dam Footprint	95-12-45
Anaerobic wood **	Pacific madrone *Arbutus menziesii*	4 fragments	late Holocene	CCO-696N Dewatering Trench	95-12-46
Anaerobic wood **	Bigleaf maple *Acer macrophyllum*	1 partially complete section	late Holocene	CCO-696N Dewatering Trench	95-12-47
Anaerobic wood **	California buckeye *Aesculus californica*	3 fragments	late Holocene 2410 +/- 60 14C B.P	CCO-696N Dewatering Trench	95-12-48

APPENDIX C

ARTIFACT DATA TABLES

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-11	13		1	V	NV					CCO-468	flake	obsidian	1	0.2	N0/W0	1MX2M	010-020	1/4"				
95-11	14		1	V	NV					CCO-468	flake	obsidian	1	2.3	N0/W0	1MX2M	020-030	1/4"				
95-11	19		1	V	NV					CCO-468	flake	obsidian	1	0.1	N0/W2	1MX2M	000-010	1/4"				
95-11	27		1	V	NV					CCO-468	flake	obsidian	1	0.2	N0/W30	.5MX2M	000-020	1/4"				
95-11	29		1	V	NV					CCO-468	flake	obsidian	1	0.3	N0/W50	.5MX2M	000-020	1/4"				
95-11	30	A	1	V	NV					CCO-468	flake	obsidian	1	0.7	N0/W50	.5MX2M	000-020	1/4"				
95-11	30	B	1	V	NV					CCO-468	flake	obsidian	1	0.7	N0/W50	.5MX2M	000-020	1/4"				
95-11	30	C	1	V	NV					CCO-468	flake	obsidian	1	0.7	N0/W50	.5MX2M	000-020	1/4"				
95-11	30	D	1	V	NV					CCO-468	flake	obsidian	1	0.7	N0/W50	.5MX2M	000-020	1/4"				
95-11	33		1	V	NV					CCO-468	flake	obsidian	1	0.3	N0/W50	.5MX2M	000-020	1/4"		W 1/2		
95-11	40		1	V	NV					CCO-468	flake	obsidian	1	0.1	S10/W40	.5MX2M	000-020	1/4"			EXP	
95-11	42		1	V	NV					CCO-468	flake	obsidian	1	0.4	-	-		-				
95-2	2		49							CCO-458/H	flake	obsidian	49	9.7	N120/W106	1MX2M	000-010	1/4"				
95-2	22		57							CCO-458/H	flake	obsidian	57	14.6	N120/W106	1MX2M	010-020	1/4"				
95-2	36		37							CCO-458/H	flake	obsidian	37	10.6	N120/W106	1MX2M	020-030	1/4"				
95-2	57		57							CCO-458/H	flake	obsidian	57	8.1	N120/W108	1MX2M	000-010	1/4"				
95-2	66		7							CCO-458/H	flake	obsidian	7	1.2	N120/W106	1MX2M	030-040	1/4"				
95-2	67		1							CCO-458/H	flake	obsidian	1	0.3	N120/W106	1MX2M	030-040	1/4"				
95-2	91		4							CCO-458/H	flake	obsidian	4	1.6	N120/W108	1MX2M	010-020	1/4"				
95-2	92		26							CCO-458/H	flake	obsidian	26	5.7	N120/W108	1MX2M	010-020	1/4"				
95-2	94		1							CCO-458/H	flake	obsidian	1	1.5	N120/W108	1MX2M	010-020	1/4"				
95-2	102		48							CCO-458/H	flake	obsidian	48	10.5	N120/W108	1MX2M	020-030	1/4"				
95-2	103	A	1							CCO-458/H	flake	obsidian	1	0.8	N120/W108	1MX2M	020-030	1/4"				
95-2	123		19							CCO-458/H	flake	obsidian	19	4.4	N120/W108	1MX2M	030-040	1/4"				
95-2	137		33							CCO-458/H	flake	obsidian	33	6.3	N122/W106	1MX2M	000-010	1/4"				
95-2	138		1							CCO-458/H	flake	obsidian	1	0.3	N122/W106	1MX2M	000-010	1/4"				
95-2	150		1							CCO-458/H	flake	obsidian	1	0.4	N122/W106	1MX2M	010-020	1/4"				
95-2	151		1							CCO-458/H	flake	obsidian	1	0.1	N122/W106	1MX2M	010-020	1/4"				
95-2	152		1							CCO-458/H	flake	obsidian	1	0.4	N122/W106	1MX2M	010-020	1/4"				
95-2	153		1							CCO-458/H	flake	obsidian	1	0.3	N122/W106	1MX2M	010-020	1/4"				
95-2	154		1							CCO-458/H	flake	obsidian	1	0.2	N122/W106	1MX2M	010-020	1/4"				
95-2	155		1							CCO-458/H	flake	obsidian	1	0.2	N122/W106	1MX2M	010-020	1/4"				
95-2	156		1							CCO-458/H	flake	obsidian	1	0.1	N122/W106	1MX2M	010-020	1/4"				
95-2	157		36							CCO-458/H	flake	obsidian	36	8.5	N122/W106	1MX2M	010-020	1/4"				
95-2	178		1							CCO-458/H	flake	obsidian	1	0.2	N122/W106	1MX2M	020-030	1/4"				
95-2	179		1							CCO-458/H	flake	obsidian	1	0.4	N122/W106	1MX2M	020-030	1/4"				
95-2	180		1							CCO-458/H	flake	obsidian	1	0.4	N122/W106	1MX2M	020-030	1/4"				
95-2	181		1							CCO-458/H	flake	obsidian	1	0.1	N122/W106	1MX2M	020-030	1/4"				
95-2	182		1							CCO-458/H	flake	obsidian	1	0.2	N122/W106	1MX2M	020-030	1/4"				
95-2	183		1							CCO-458/H	flake	obsidian	1	0.2	N122/W106	1MX2M	020-030	1/4"				
95-2	184		1							CCO-458/H	flake	obsidian	1	0.5	N122/W106	1MX2M	020-030	1/4"				
95-2	185		1							CCO-458/H	flake	obsidian	1	0.1	N122/W106	1MX2M	020-030	1/4"				
95-2	186		1							CCO-458/H	flake	obsidian	1	0.1	N122/W106	1MX2M	020-030	1/4"				
95-2	187		1							CCO-458/H	flake	obsidian	1	0.1	N122/W106	1MX2M	020-030	1/4"				
95-2	188		16							CCO-458/H	flake	obsidian	16	4.5	N122/W106	1MX2M	020-030	1/4"				
95-2	200		13							CCO-458/H	flake	obsidian	13	2.3	N122/W106	1MX2M	030-040	1/4"				
95-2	215		1							CCO-458/H	flake	obsidian	1	0.9	N124/W107	1MX2M	000-020	1/4"				
95-2	216		1							CCO-458/H	flake	obsidian	1	0.2	N124/W107	1MX2M	000-020	1/4"				
95-2	217		1							CCO-458/H	flake	obsidian	1	0.2	N124/W107	1MX2M	000-020	1/4"				
95-2	219		1							CCO-458/H	flake	obsidian	1	0.4	N124/W107	1MX2M	000-020	1/4"				
95-2	221		1							CCO-458/H	flake	obsidian	1	0.3	N124/W107	1MX2M	000-020	1/4"				
95-2	222		1							CCO-458/H	flake	obsidian	1	0.1	N124/W107	1MX2M	000-020	1/4"				
95-2	223		1							CCO-458/H	flake	obsidian	1	0.1	N124/W107	1MX2M	000-020	1/4"				
95-2	224		1							CCO-458/H	flake	obsidian	1	0.1	N124/W107	1MX2M	000-020	1/4"				
95-2	226		1							CCO-458/H	flake	obsidian	1	0.1	N124/W107	1MX2M	000-020	1/4"				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-2	228		79							CCO-458/H	flake	obsidian	79	23.7	N124/W107	1MX2M	000-020	1/4"				
95-2	246		1							CCO-458/H	flake	obsidian	1	0.6	N124/W107	1MX2M	020-030	1/4"				
95-2	247		56							CCO-458/H	flake	obsidian	56	9.7	N124/W107	1MX2M	020-030	1/4"				
95-2	259		22							CCO-458/H	flake	obsidian	22	4.4	N124/W107	1MX2M	030-040	1/4"				
95-2	272		1							CCO-458/H	flake	obsidian	1	0.05	N124/W107	1MX2M	030-040	1/4"				
95-2	273		1							CCO-458/H	flake	obsidian	1	0.1	N124/W107	1MX2M	030-040	1/4"				
95-2	274		1							CCO-458/H	flake	obsidian	1	0.1	N124/W107	1MX2M	030-040	1/4"				
95-2	275		1							CCO-458/H	flake	obsidian	1	0.3	N124/W107	1MX2M	030-040	1/4"				
95-2	276		1							CCO-458/H	flake	obsidian	1	0.2	N124/W107	1MX2M	030-040	1/4"				
95-2	277		1							CCO-458/H	flake	obsidian	1	0.6	N124/W107	1MX2M	030-040	1/4"				
95-2	278		1							CCO-458/H	flake	obsidian	1	0.7	N124/W107	1MX2M	030-040	1/4"				
95-2	279		1							CCO-458/H	flake	obsidian	1	0.7	N124/W107	1MX2M	030-040	1/4"				
95-2	280		1							CCO-458/H	flake	obsidian	1	0.3	N124/W107	1MX2M	030-040	1/4"				
95-2	281		1							CCO-458/H	flake	obsidian	1	0.2	N124/W107	1MX2M	030-040	1/4"				
95-2	282		1							CCO-458/H	flake	obsidian	1	0.3	N124/W107	1MX2M	030-040	1/4"				
95-2	283		1							CCO-458/H	flake	obsidian	1	1	N124/W107	1MX2M	030-040	1/4"				
95-2	284		1							CCO-458/H	flake	obsidian	1	0.7	N124/W107	1MX2M	030-040	1/4"				
95-2	303		19							CCO-458/H	flake	obsidian	19	4.9	N124/W107	1MX2M	040-050	1/4"				
95-2	304		1							CCO-458/H	flake	obsidian	1	0.1	N124/W107	1MX2M	040-050	1/4"				
95-2	305		1							CCO-458/H	flake	obsidian	1	0.1	N124/W107	1MX2M	040-050	1/4"				
95-2	306		1							CCO-458/H	flake	obsidian	1	0.1	N124/W107	1MX2M	040-050	1/4"				
95-2	307		1							CCO-458/H	flake	obsidian	1	0.6	N124/W107	1MX2M	040-050	1/4"				
95-2	308		1							CCO-458/H	flake	obsidian	1	1.4	N124/W107	1MX2M	040-050	1/4"				
95-2	310		1							CCO-458/H	flake	obsidian	1	0.5	N124/W107	1MX2M	040-050	1/4"				
95-2	311		1							CCO-458/H	flake	obsidian	1	0.3	N124/W107	1MX2M	040-050	1/4"				
95-2	312		1							CCO-458/H	flake	obsidian	1	0.3	N124/W107	1MX2M	040-050	1/4"				
95-2	313		1							CCO-458/H	flake	obsidian	1	0.4	N124/W107	1MX2M	040-050	1/4"				
95-2	320		1							CCO-458/H	flake	obsidian	1	0.8	N120/W105	1MX2M	000-010	1/4"				
95-2	322		1							CCO-458/H	flake	obsidian	1	1.4	N120/W105	1MX2M	000-010	1/4"				
95-2	325		1							CCO-458/H	flake	obsidian	1	0.2	N120/W105	1MX2M	000-010	1/4"				
95-2	326		1							CCO-458/H	flake	obsidian	1	0.2	N120/W105	1MX2M	000-010	1/4"				
95-2	327		1							CCO-458/H	flake	obsidian	1	0.1	N120/W105	1MX2M	000-010	1/4"				
95-2	328		1							CCO-458/H	flake	obsidian	1	0.5	N120/W105	1MX2M	000-010	1/4"				
95-2	329		1							CCO-458/H	flake	obsidian	1	0.3	N120/W105	1MX2M	000-010	1/4"				
95-2	330		45							CCO-458/H	flake	obsidian	45	9.5	N120/W105	1MX2M	000-010	1/4"				
95-2	336		1							CCO-458/H	flake	obsidian	1	0.5	N120/W105	1MX2M	000-010	1/4"				
95-2	348		1							CCO-458/H	flake	obsidian	1	0.8	N120/W105	1MX2M	010-020	1/4"				
95-2	350		1							CCO-458/H	flake	obsidian	1	0.2	N120/W105	1MX2M	010-020	1/4"				
95-2	351		1							CCO-458/H	flake	obsidian	1	0.2	N120/W105	1MX2M	010-020	1/4"				
95-2	352		1							CCO-458/H	flake	obsidian	1	0.1	N120/W105	1MX2M	010-020	1/4"				
95-2	353		1							CCO-458/H	flake	obsidian	1	0.3	N120/W105	1MX2M	010-020	1/4"				
95-2	354		1							CCO-458/H	flake	obsidian	1	0.4	N120/W105	1MX2M	010-020	1/4"				
95-2	355		1							CCO-458/H	flake	obsidian	1	0.9	N120/W105	1MX2M	010-020	1/4"				
95-2	356		1							CCO-458/H	flake	obsidian	1	2.1	N120/W105	1MX2M	010-020	1/4"				
95-2	357		1							CCO-458/H	flake	obsidian	1	0.9	N120/W105	1MX2M	010-020	1/4"				
95-2	358		41							CCO-458/H	flake	obsidian	41	9.5	N120/W105	1MX2M	010-020	1/4"				
95-2	373		1							CCO-458/H	flake	obsidian	1	0.2	N120/W105	1MX2M	020-030	1/4"				
95-2	374		1							CCO-458/H	flake	obsidian	1	0.7	N120/W105	1MX2M	020-030	1/4"				
95-2	375		1							CCO-458/H	flake	obsidian	1	0.3	N120/W105	1MX2M	020-030	1/4"				
95-2	376		1							CCO-458/H	flake	obsidian	1	0.3	N120/W105	1MX2M	020-030	1/4"				
95-2	378		39							CCO-458/H	flake	obsidian	39	8.8	N120/W105	1MX2M	020-030	1/4"				
95-2	393		1							CCO-458/H	flake	obsidian	1	0.4	N122/W108	1MX2M	000-010	1/4"				
95-2	394		1							CCO-458/H	flake	obsidian	1	0.2	N122/W108	1MX2M	000-010	1/4"				
95-2	395		1							CCO-458/H	flake	obsidian	1	0.2	N122/W108	1MX2M	000-010	1/4"				
95-2	396		1							CCO-458/H	flake	obsidian	1	0.6	N122/W108	1MX2M	000-010	1/4"				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-2	397		1							CCO-458/H	flake	obsidian	1	0.6	N122/W108	1MX2M	000-010	1/4"				
95-2	398		1							CCO-458/H	flake	obsidian	1	1.1	N122/W108	1MX2M	000-010	1/4"				
95-2	399		18							CCO-458/H	flake	obsidian	18	6.8	N122/W108	1MX2M	000-010	1/4"				
95-2	422		30							CCO-458/H	flake	obsidian	30	11.2	N122/W108	1MX2M	010-020	1/4"				
95-2	426		1							CCO-458/H	flake	obsidian	1	0.6	N122/W108	1MX2M	010-020	1/4"				
95-2	427		1							CCO-458/H	flake	obsidian	1	0.4	N122/W108	1MX2M	010-020	1/4"				
95-2	428		1							CCO-458/H	flake	obsidian	1	0.4	N122/W108	1MX2M	010-020	1/4"				
95-2	444		34							CCO-458/H	flake	obsidian	34	8.4	N122/W108	1MX2M	020-030	1/4"				
95-2	463		19							CCO-458/H	flake	obsidian	19	6.6	N122/W108	1MX2M	030-040	1/4"				
95-2	470		1							CCO-458/H	flake	obsidian	1	0.6	N122/W108	1MX2M	040-050	1/4"				
95-2	471		8							CCO-458/H	flake	obsidian	8	2.9	N122/W108	1MX2M	040-050	1/4"				
95-2	488		1							CCO-458/H	flake	obsidian	1	0.2	N124/W105	1MX2M	000-010	1/4"				
95-2	489	A	1	V	NV					CCO-458/H	flake	obsidian	29	7.1	N124/W105	1MX2M	000-010	1/4"				
95-2	489	B	9	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	000-010	1/4"				
95-2	489	C	3	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	000-010	1/4"				
95-2	489	D	12	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	000-010	1/4"				
95-2	489	E	4	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	000-010	1/4"				
95-2	501		1							CCO-458/H	flake	obsidian	1	0.3	N120/W107	1MX2M	000-010	1/4"				
95-2	502		22							CCO-458/H	flake	obsidian	22	11.6	N120/W107	1MX2M	000-010	1/4"				
95-2	517		1							CCO-458/H	flake	obsidian	1	3.8	N120/W107	1MX2M	010-020	1/4"				
95-2	522		36							CCO-458/H	flake	obsidian	36	10.7	N120/W107	1MX2M	010-020	1/4"				
95-2	532		1							CCO-458/H	flake	obsidian	1	0.4	N120/W107	1MX2M	020-030	1/4"				
95-2	533		1							CCO-458/H	flake	obsidian	1	0.3	N120/W107	1MX2M	020-030	1/4"				
95-2	534		1							CCO-458/H	flake	obsidian	1	3.2	N120/W107	1MX2M	020-030	1/4"				
95-2	535		1							CCO-458/H	flake	obsidian	1	0.3	N120/W107	1MX2M	020-030	1/4"				
95-2	536		1							CCO-458/H	flake	obsidian	1	1.3	N120/W107	1MX2M	020-030	1/4"				
95-2	537		1							CCO-458/H	flake	obsidian	1	0.2	N120/W107	1MX2M	020-030	1/4"				
95-2	538		35							CCO-458/H	flake	obsidian	35	8.2	N120/W107	1MX2M	020-030	1/4"				
95-2	552		12							CCO-458/H	flake	obsidian	12	4.8	N120/W107	1MX2M	030-040	1/4"				
95-2	563		31							CCO-458/H	flake	obsidian	31	11.5	N122/W105	1MX2M	000-010	1/4"				
95-2	580		1							CCO-458/H	flake	obsidian	1	1	N122/W105	1MX2M	010-020	1/4"				
95-2	581		1							CCO-458/H	flake	obsidian	1	1.7	N122/W105	1MX2M	010-020	1/4"				
95-2	582		1							CCO-458/H	flake	obsidian	1	0.05	N122/W105	1MX2M	010-020	1/4"				
95-2	583		1							CCO-458/H	flake	obsidian	1	0.3	N122/W105	1MX2M	010-020	1/4"				
95-2	584		1							CCO-458/H	flake	obsidian	1	0.1	N122/W105	1MX2M	010-020	1/4"				
95-2	585		1							CCO-458/H	flake	obsidian	1	0.4	N122/W105	1MX2M	010-020	1/4"				
95-2	586		1							CCO-458/H	flake	obsidian	1	0.4	N122/W105	1MX2M	010-020	1/4"				
95-2	587		1							CCO-458/H	flake	obsidian	1	0.1	N122/W105	1MX2M	010-020	1/4"				
95-2	588		1							CCO-458/H	flake	obsidian	1	0.5	N122/W105	1MX2M	010-020	1/4"				
95-2	589		42							CCO-458/H	flake	obsidian	42	10.1	N122/W105	1MX2M	010-020	1/4"				
95-2	605		1							CCO-458/H	flake	obsidian	1	0.2	N122/W105	1MX2M	020-030	1/4"				
95-2	606		43							CCO-458/H	flake	obsidian	43	11.4	N122/W105	1MX2M	020-030	1/4"				
95-2	621		1							CCO-458/H	flake	obsidian	1	0.6	N122/W105	1MX2M	030-040	1/4"				
95-2	622		14							CCO-458/H	flake	obsidian	14	4.4	N122/W105	1MX2M	030-040	1/4"				
95-2	635		1	V	NV					CCO-458/H	flake	obsidian	1	0.2	N122/W110	1MX2M	000-010	1/4"				
95-2	637		1							CCO-458/H	flake	obsidian	1	0.2	N122/W110	1MX2M	000-010	1/4"				
95-2	638		1							CCO-458/H	flake	obsidian	1	0.5	N122/W110	1MX2M	000-010	1/4"				
95-2	639		33							CCO-458/H	flake	obsidian	33	8.9	N122/W110	1MX2M	000-010	1/4"				
95-2	656		7							CCO-458/H	flake	obsidian	7	1.7	N122/W110	1MX2M	010-020	1/4"				
95-2	669		1							CCO-458/H	flake	obsidian	1	0.3	N122/W110	1MX2M	020-030	1/4"				
95-2	670		1							CCO-458/H	flake	obsidian	1	0.2	N122/W110	1MX2M	020-030	1/4"				
95-2	671		37							CCO-458/H	flake	obsidian	37	11.9	N122/W110	1MX2M	020-030	1/4"				
95-2	688		1							CCO-458/H	flake	obsidian	1	0.4	N122/W110	1MX2M	030-040	1/4"				
95-2	689		1							CCO-458/H	flake	obsidian	1	0.9	N122/W110	1MX2M	030-040	1/4"				
95-2	690		1							CCO-458/H	flake	obsidian	1	0.3	N122/W110	1MX2M	030-040	1/4"				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-2	691		1							CCO-458/H	flake	obsidian	1	0.4	N122/W110	1MX2M	030-040	1/4"				
95-2	692		1							CCO-458/H	flake	obsidian	1	0.4	N122/W110	1MX2M	030-040	1/4"				
95-2	693		28							CCO-458/H	flake	obsidian	28	6.3	N122/W110	1MX2M	030-040	1/4"				
95-2	706		1							CCO-458/H	flake	obsidian	1	2.2	N122/W110	1MX2M	030-040	1/4"				
95-2	708		1							CCO-458/H	flake	obsidian	1	0.2	N122/W110	1MX2M	040-050	1/4"				
95-2	709		16							CCO-458/H	flake	obsidian	16	3.4	N122/W110	1MX2M	040-050	1/4"				
95-2	710		1							CCO-458/H	flake	obsidian	1	0.2	N122/W110	1MX2M	040-050	1/4"				
95-2	725		1							CCO-458/H	flake	obsidian	1	0.6	N122/W110	1MX2M	050-060	1/4"				
95-2	726		20							CCO-458/H	flake	obsidian	20	4.5	N122/W110	1MX2M	050-060	1/4"				
95-2	741		1							CCO-458/H	flake	obsidian	1	0.2	N122/W110	1MX2M	060-070	1/4"				
95-2	742		1							CCO-458/H	flake	obsidian	1	0.3	N122/W110	1MX2M	060-070	1/4"				
95-2	743		5							CCO-458/H	flake	obsidian	5	1	N122/W110	1MX2M	060-070	1/4"				
95-2	760		1							CCO-458/H	flake	obsidian	1	1.3	N122/W107	1MX2M	000-010	1/4"				
95-2	761		1							CCO-458/H	flake	obsidian	1	0.4	N122/W107	1MX2M	000-010	1/4"				
95-2	762		1							CCO-458/H	flake	obsidian	1	0.3	N122/W107	1MX2M	000-010	1/4"				
95-2	763		1							CCO-458/H	flake	obsidian	1	0.1	N122/W107	1MX2M	000-010	1/4"				
95-2	764		1							CCO-458/H	flake	obsidian	1	0.3	N122/W107	1MX2M	000-010	1/4"				
95-2	765		1							CCO-458/H	flake	obsidian	1	0.2	N122/W107	1MX2M	000-010	1/4"				
95-2	766		31							CCO-458/H	flake	obsidian	31	7.4	N122/W107	1MX2M	000-010	1/4"				
95-2	781		1							CCO-458/H	flake	obsidian	1	2	N122/W107	1MX2M	010-020	1/4"				
95-2	782		1							CCO-458/H	flake	obsidian	1	0.6	N122/W107	1MX2M	010-020	1/4"				
95-2	783		1							CCO-458/H	flake	obsidian	1	0.6	N122/W107	1MX2M	010-020	1/4"				
95-2	784		1							CCO-458/H	flake	obsidian	1	0.5	N122/W107	1MX2M	010-020	1/4"				
95-2	785		1							CCO-458/H	flake	obsidian	1	0.5	N122/W107	1MX2M	010-020	1/4"				
95-2	786		32							CCO-458/H	flake	obsidian	32	8.3	N122/W107	1MX2M	010-020	1/4"				
95-2	805		1							CCO-458/H	flake	obsidian	1	0.4	N122/W107	1MX2M	020-030	1/4"				
95-2	806		1							CCO-458/H	flake	obsidian	1	0.6	N122/W107	1MX2M	020-030	1/4"				
95-2	807		1							CCO-458/H	flake	obsidian	1	0.7	N122/W107	1MX2M	020-030	1/4"				
95-2	808		1							CCO-458/H	flake	obsidian	1	0.3	N122/W107	1MX2M	020-030	1/4"				
95-2	809		1							CCO-458/H	flake	obsidian	1	0.3	N122/W107	1MX2M	020-030	1/4"				
95-2	810		57							CCO-458/H	flake	obsidian	57	14.1	N122/W107	1MX2M	020-030	1/4"				
95-2	828		1							CCO-458/H	flake	obsidian	1	0.4	N126/W106	1MX2M	000-010	1/4"				
95-2	829		7							CCO-458/H	flake	obsidian	7	1	N126/W106	1MX2M	000-010	1/4"				
95-2	843		1							CCO-458/H	flake	obsidian	1	0.3	N126/W106	1MX2M	010-020	1/4"				
95-2	844		1							CCO-458/H	flake	obsidian	1	0.6	N126/W106	1MX2M	010-020	1/4"				
95-2	845		1							CCO-458/H	flake	obsidian	1	0.2	N126/W106	1MX2M	010-020	1/4"				
95-2	846		1							CCO-458/H	flake	obsidian	1	0.2	N126/W106	1MX2M	010-020	1/4"				
95-2	847		1							CCO-458/H	flake	obsidian	1	0.9	N126/W106	1MX2M	010-020	1/4"				
95-2	848		1							CCO-458/H	flake	obsidian	1	0.5	N126/W106	1MX2M	010-020	1/4"				
95-2	850		27							CCO-458/H	flake	obsidian	27	5.9	N126/W106	1MX2M	010-020	1/4"				
95-2	868		1							CCO-458/H	flake	obsidian	1	0.3	N126/W106	1MX2M	020-030	1/4"				
95-2	871		1							CCO-458/H	flake	obsidian	1	1.3	N126/W106	1MX2M	020-030	1/4"				
95-2	872		1							CCO-458/H	flake	obsidian	1	2.7	N126/W106	1MX2M	020-030	1/4"				
95-2	873		1							CCO-458/H	flake	obsidian	1	0.4	N126/W106	1MX2M	020-030	1/4"				
95-2	874		1							CCO-458/H	flake	obsidian	1	0.8	N126/W106	1MX2M	020-030	1/4"				
95-2	875		28							CCO-458/H	flake	obsidian	28	4.7	N126/W106	1MX2M	020-030	1/4"				
95-2	894		1							CCO-458/H	flake	obsidian	1	0.5	N126/W106	1MX2M	030-040	1/4"				
95-2	895		21							CCO-458/H	flake	obsidian	21	5.55	N126/W106	1MX2M	030-040	1/4"				
95-2	920		1							CCO-458/H	flake	obsidian	1	9.3	N126/W106	1MX2M	040-050	1/4"				
95-2	921		1							CCO-458/H	flake	obsidian	1	0.5	N126/W106	1MX2M	040-050	1/4"				
95-2	922		28							CCO-458/H	flake	obsidian	28	5.35	N126/W106	1MX2M	040-050	1/4"				
95-2	945		2							CCO-458/H	flake	obsidian	2	0.4	N126/W106	1MX2M	050-060	1/4"				
95-2	962		12							CCO-458/H	flake	obsidian	12	4.7	N120/W105	1MX2M	030-040	1/4"				
95-2	982		1							CCO-458/H	flake	obsidian	1	0.3	N122/W104	1MX2M	000-010	1/4"				
95-2	983		1							CCO-458/H	flake	obsidian	1	0.3	N122/W104	1MX2M	000-010	1/4"				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-2	984		26							CCO-458/H	flake	obsidian	26	6.2	N122/W104	1MX2M	000-010	1/4"				
95-2	999		41							CCO-458/H	flake	obsidian	41	9.3	N122/W104	1MX2M	010-020	1/4"				
95-2	1010	A	6	V	NV					CCO-458/H	flake	obsidian	29	14.7	N124/W105	1MX2M	010-020	1/4"				
95-2	1010	B	2	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	010-020	1/4"				
95-2	1010	C	4	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	010-020	1/4"				
95-2	1010	D	15	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	010-020	1/4"				
95-2	1010	E	1	V	AN					CCO-458/H	flake	obsidian			N124/W105	1MX2M	010-020	1/4"				
95-2	1010	F	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	010-020	1/4"				
95-2	1015		1	V	NV					CCO-458/H	flake	obsidian	1	0.1	N124/W105	1MX2M	010-020	1/4"				
95-2	1016		1	V	NV					CCO-458/H	flake	obsidian	1	0.1	N124/W105	1MX2M	010-020	1/4"				
95-2	1017		1	V	NV					CCO-458/H	flake	obsidian	1	0.2	N124/W105	1MX2M	010-020	1/4"				
95-2	1019		1							CCO-458/H	flake	obsidian	1	1.3	N124/W105	1MX2M	010-020	1/4"				
95-2	1032		1							CCO-458/H	flake	obsidian	1	0.3	N124/W105	1MX2M	020-030	1/4"				
95-2	1035		1	V	NV					CCO-458/H	flake	obsidian	1	1	N124/W105	1MX2M	020-030	1/4"				
95-2	1036		1	V	NV					CCO-458/H	flake	obsidian	1	0.4	N124/W105	1MX2M	020-030	1/4"				
95-2	1037		1	V	NV					CCO-458/H	flake	obsidian	1	0.4	N124/W105	1MX2M	020-030	1/4"				
95-2	1038		1	V	NV					CCO-458/H	flake	obsidian	1	1.5	N124/W105	1MX2M	020-030	1/4"				
95-2	1039		1							CCO-458/H	flake	obsidian	1	0.3	N124/W105	1MX2M	020-030	1/4"				
95-2	1040		1	V	NV					CCO-458/H	flake	obsidian	1	0.3	N124/W105	1MX2M	020-030	1/4"				
95-2	1042	A	2	V	NV					CCO-458/H	flake	obsidian	20	5	N124/W105	1MX2M	020-030	1/4"				
95-2	1042	B	16	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	020-030	1/4"				
95-2	1042	C	2	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	020-030	1/4"				
95-2	1059		1	V	NV					CCO-458/H	flake	obsidian	1	0.3	N124/W105	1MX2M	030-040	1/4"				
95-2	1060		1	V	NV					CCO-458/H	flake	obsidian	1	0.8	N124/W105	1MX2M	030-040	1/4"				
95-2	1062	A	1	V	NV					CCO-458/H	flake	obsidian	28	9.2	N124/W105	1MX2M	030-040	1/4"				
95-2	1062	B	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1062	C	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1062	D	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1062	F	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1062	G	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1062	H	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1062	I	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1062	J	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1062	K	5	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1062	L	9	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1062	M	2	V	BH					CCO-458/H	flake	obsidian			N124/W105	1MX2M	030-040	1/4"				
95-2	1080		1	V	BH					CCO-458/H	flake	obsidian	1	0.2	N124/W105	1MX2M	040-050	1/4"				
95-2	1081		1	V	NV					CCO-458/H	flake	obsidian	1	0.3	N124/W105	1MX2M	040-050	1/4"				
95-2	1082		1	V	NV					CCO-458/H	flake	obsidian	1	0.7	N124/W105	1MX2M	040-050	1/4"				
95-2	1083		1	V	NV					CCO-458/H	flake	obsidian	1	0.2	N124/W105	1MX2M	040-050	1/4"				
95-2	1084	A	5	V	NV					CCO-458/H	flake	obsidian	16	4.8	N124/W105	1MX2M	040-050	1/4"				
95-2	1084	B	9	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	040-050	1/4"				
95-2	1084	C	2	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	040-050	1/4"				
95-2	1099	A	3	V	NV					CCO-458/H	flake	obsidian	15	3.6	N124/W105	1MX2M	050-060	1/4"				
95-2	1099	B	6	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	050-060	1/4"				
95-2	1099	C	6	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	050-060	1/4"				
95-2	1103		1	V	NV					CCO-458/H	flake	obsidian	1	0.4	N124/W105	1MX2M	050-060	1/4"				
95-2	1104		1	V	NV					CCO-458/H	flake	obsidian	1	0.4	N124/W105	1MX2M	050-060	1/4"				
95-2	1105		1	V	NV					CCO-458/H	flake	obsidian	1	1.3	N124/W105	1MX2M	050-060	1/4"				
95-2	1106		1	V	NV					CCO-458/H	flake	obsidian	1	0.8	N124/W105	1MX2M	050-060	1/4"				
95-2	1107		1	V	NV					CCO-458/H	flake	obsidian	1	1.2	N124/W105	1MX2M	050-060	1/4"				
95-2	1118		1	NV						CCO-458/H	flake	obsidian	1	0.3	N124/W105	1MX2M	060-070	1/4"				
95-2	1119		1	V	NV					CCO-458/H	flake	obsidian	1	0.3	N124/W105	1MX2M	060-070	1/4"				
95-2	1120	A	1	V	NV					CCO-458/H	flake	obsidian	10	2.5	N124/W105	1MX2M	060-070	1/4"				
95-2	1120	B	3	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	060-070	1/4"				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-2	1120	C	6	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	060-070	1/4"				
95-2	1120	D	1	V	IND.					CCO-458/H	flake	obsidian			N124/W105	1MX2M	060-070	1/4"				
95-2	1133		1	V	NV					CCO-458/H	flake	obsidian	1	0.8	N124/W105	1MX2M	070-080	1/4"				
95-2	1134		1	V	NV					CCO-458/H	flake	obsidian	1	0.3	N124/W105	1MX2M	070-080	1/4"				
95-2	1135	A	1	V	NV					CCO-458/H	flake	obsidian	5	1	N124/W105	1MX2M	070-080	1/4"				
95-2	1135	B	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	070-080	1/4"				
95-2	1135	C	1	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	070-080	1/4"				
95-2	1135	D	2	V	NV					CCO-458/H	flake	obsidian			N124/W105	1MX2M	070-080	1/4"				
95-2	1144		1	V	NV					CCO-458/H	flake	obsidian	1	0.5	N124/W105	1MX2M	080-090	1/4"				
95-2	1145		2	V	NV					CCO-458/H	flake	obsidian	2	0.3	N124/W105	1MX2M	080-090	1/4"				
95-2	1156		1	V	NV					CCO-458/H	flake	obsidian	1	0.2	N124/W105	1MX2M	090-100	1/4"				
95-2	1165		1	V	BH					CCO-458/H	flake	obsidian	1	0.2	N124/W105	1MX2M	100-110	1/4"				
95-2	1188		1	V	BH					CCO-458/H	flake	obsidian	1	0.3	N124/W105	1MX2M	120-130	1/4"				
95-2	1197	A	1	V	NV					CCO-458/H	flake	obsidian	4	1.5	N124/W105	1MX2M	130-140	1/4"				
95-2	1197	B	1	V	AN					CCO-458/H	flake	obsidian			N124/W105	1MX2M	130-140	1/4"				
95-2	1197	C	1	V	BH?					CCO-458/H	flake	obsidian	1		N124/W105	1MX2M	130-140	1/4"				
95-2	1197	D	1	V	CD?					CCO-458/H	flake	obsidian	1		N124/W105	1MX2M	130-140	1/4"				
95-2	1211	A	1	V	NV					CCO-458/H	flake	obsidian	2	1.1	N124/W105	1MX2M	150-160	1/4"				
95-2	1211	B	1	V	BH					CCO-458/H	flake	obsidian			N124/W105	1MX2M	150-160	1/4"				
95-2	1229		1							CCO-458/H	flake	obsidian	1	1.1	N124/W109	1MX2M	000-010	1/4"				
95-2	1230		1							CCO-458/H	flake	obsidian	1	0.2	N124/W109	1MX2M	000-010	1/4"				
95-2	1231		1							CCO-458/H	flake	obsidian	1	0.2	N124/W109	1MX2M	000-010	1/4"				
95-2	1232		1							CCO-458/H	flake	obsidian	1	0.4	N124/W109	1MX2M	000-010	1/4"				
95-2	1233		1							CCO-458/H	flake	obsidian	1	0.2	N124/W109	1MX2M	000-010	1/4"				
95-2	1234		1							CCO-458/H	flake	obsidian	1	0.4	N124/W109	1MX2M	000-010	1/4"				
95-2	1235		1							CCO-458/H	flake	obsidian	1	0.8	N124/W109	1MX2M	000-010	1/4"				
95-2	1236		47							CCO-458/H	flake	obsidian	47	7.95	N124/W109	1MX2M	000-010	1/4"				
95-2	1248		1							CCO-458/H	flake	obsidian	1	0.6	N124/W109	1MX2M	010-020	1/4"				
95-2	1249		1							CCO-458/H	flake	obsidian	1	0.3	N124/W109	1MX2M	010-020	1/4"				
95-2	1250		1							CCO-458/H	flake	obsidian	1	1.2	N124/W109	1MX2M	010-020	1/4"				
95-2	1251		1							CCO-458/H	flake	obsidian	1	0.4	N124/W109	1MX2M	010-020	1/4"				
95-2	1257		2							CCO-458/H	-	obsidian	2	0.6	N124/W109	1MX2M	010-020	1/4"				
95-2	1258		53							CCO-458/H	flake	obsidian	53	12	N124/W109	1MX2M	010-020	1/4"				
95-2	1273		1							CCO-458/H	flake	obsidian	1	0.7	N124/W109	1MX2M	020-030	1/4"				
95-2	1274		1							CCO-458/H	flake	obsidian	1	0.6	N124/W109	1MX2M	020-030	1/4"				
95-2	1276		42							CCO-458/H	flake	obsidian	42	8.3	N124/W109	1MX2M	020-030	1/4"				
95-2	1294		1							CCO-458/H	flake	obsidian	1	0.3	N124/W109	1MX2M	030-040	1/4"				
95-2	1295		1							CCO-458/H	flake	obsidian	1	0.6	N124/W109	1MX2M	030-040	1/4"				
95-2	1296		1							CCO-458/H	flake	obsidian	1	0.2	N124/W109	1MX2M	030-040	1/4"				
95-2	1297		1							CCO-458/H	flake	obsidian	1	0.3	N124/W109	1MX2M	030-040	1/4"				
95-2	1300		32							CCO-458/H	flake	obsidian	32	8.6	N124/W109	1MX2M	030-040	1/4"				
95-2	1318		1							CCO-458/H	flake	obsidian	1	0.3	N124/W109	1MX2M	040-050	1/4"				
95-2	1321		1							CCO-458/H	flake	obsidian	1	2.1	N124/W109	1MX2M	040-050	1/4"				
95-2	1322		26							CCO-458/H	flake	obsidian	26	7.6	N124/W109	1MX2M	040-050	1/4"				
95-2	1348		1							CCO-458/H	flake	obsidian	1	0.6	N126/W103	1MX2M	000-010	1/4"				
95-2	1349		1							CCO-458/H	flake	obsidian	1	0.1	N126/W103	1MX2M	000-010	1/4"				
95-2	1350		29							CCO-458/H	flake	obsidian	29	6.5	N126/W103	1MX2M	000-010	1/4"				
95-2	1368		42							CCO-458/H	flake	obsidian	42	8.3	N126/W103	1MX2M	010-020	1/4"				
95-2	1389		1							CCO-458/H	flake	obsidian	1	0.3	N126/W103	1MX2M	020-030	1/4"				
95-2	1390		1							CCO-458/H	flake	obsidian	1	1.2	N126/W103	1MX2M	020-030	1/4"				
95-2	1391		1							CCO-458/H	flake	obsidian	1	2.3	N126/W103	1MX2M	020-030	1/4"				
95-2	1393		20							CCO-458/H	flake	obsidian	20	4.3	N126/W103	1MX2M	020-030	1/4"				
95-2	1412		1							CCO-458/H	flake	obsidian	1	1.7	N126/W103	1MX2M	030-040	1/4"				
95-2	1413		13							CCO-458/H	flake	obsidian	13	3.3	N126/W103	1MX2M	030-040	1/4"				
95-2	1435		14							CCO-458/H	flake	obsidian	14	3.1	N126/W103	1MX2M	040-050	1/4"				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-2	1453		7							CCO-458/H	flake	obsidian	7	1.7	N126/W103	1MX2M	050-060	1/4"				
95-2	1473		1							CCO-458/H	flake	obsidian	1	0.2	N126/W103104	1MX2M	060-070	1/4"				
95-2	1474		1							CCO-458/H	flake	obsidian	1	0.2	N126/W103104	1MX2M	060-070	1/4"				
95-2	1487		1	V	NV					CCO-458/H	flake	obsidian	1	1.4	N126/W110	1MX2M	000-010	1/4"				
95-2	1488		1	V	NV					CCO-458/H	flake	obsidian	1	0.4	N126/W110	1MX2M	000-010	1/4"				
95-2	1489		1	V	NV					CCO-458/H	flake	obsidian	1	0.5	N126/W110	1MX2M	000-010	1/4"				
95-2	1490		1	V	NV					CCO-458/H	flake	obsidian	1	0.2	N126/W110	1MX2M	000-010	1/4"				
95-2	1491		1	V	NV					CCO-458/H	flake	obsidian	1	0.2	N126/W110	1MX2M	000-010	1/4"				
95-2	1492		1	V	NV					CCO-458/H	flake	obsidian	1	0.7	N126/W110	1MX2M	000-010	1/4"				
95-2	1493	A	16	V	NV					CCO-458/H	flake	obsidian	48	11.3	N126/W110	1MX2M	000-010	1/4"				
95-2	1493	B	7	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	000-010	1/4"				
95-2	1493	C	7	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	000-010	1/4"				
95-2	1493	D	16	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	000-010	1/4"				
95-2	1493	E	1	V	BH					CCO-458/H	flake	obsidian			N126/W110	1MX2M	000-010	1/4"				
95-2	1512		1							CCO-458/H	flake	obsidian	1	0.4	N122/W104	1MX2M	020-030	1/4"				
95-2	1513		1							CCO-458/H	flake	obsidian	1	0.4	N122/W104	1MX2M	020-030	1/4"				
95-2	1514		1							CCO-458/H	flake	obsidian	1	0.2	N122/W104	1MX2M	020-030	1/4"				
95-2	1515		1							CCO-458/H	flake	obsidian	1	0.2	N122/W104	1MX2M	020-030	1/4"				
95-2	1516		27							CCO-458/H	flake	obsidian	27	7.5	N122/W104	1MX2M	020-030	1/4"				
95-2	1532		1							CCO-458/H	flake	obsidian	1	0.7	N122/W104	1MX2M	030-040	1/4"				
95-2	1533		1							CCO-458/H	flake	obsidian	1	0.2	N122/W104	1MX2M	030-040	1/4"				
95-2	1534		1							CCO-458/H	flake	obsidian	1	0.8	N122/W104	1MX2M	030-040	1/4"				
95-2	1535		26							CCO-458/H	flake	obsidian	26	8.2	N122/W104	1MX2M	030-040	1/4"				
95-2	1555		1							CCO-458/H	flake	obsidian	1	1.8	N125/W105	1MX2M	000-010	1/4"				
95-2	1556		1							CCO-458/H	flake	obsidian	1	0.1	N125/W105	1MX2M	000-010	1/4"				
95-2	1557		1							CCO-458/H	flake	obsidian	1	0.1	N125/W105	1MX2M	000-010	1/4"				
95-2	1558		1							CCO-458/H	flake	obsidian	1	0.3	N125/W105	1MX2M	000-010	1/4"				
95-2	1559		1							CCO-458/H	flake	obsidian	1	0.4	N125/W105	1MX2M	000-010	1/4"				
95-2	1561		1							CCO-458/H	flake	obsidian	1	0.6	N125/W105	1MX2M	000-010	1/4"				
95-2	1562		1							CCO-458/H	flake	obsidian	1	0.8	N125/W105	1MX2M	000-010	1/4"				
95-2	1563		1							CCO-458/H	flake	obsidian	1	0.7	N125/W105	1MX2M	000-010	1/4"				
95-2	1564		1							CCO-458/H	flake	obsidian	1	0.9	N125/W105	1MX2M	000-010	1/4"				
95-2	1565		1							CCO-458/H	flake	obsidian	1	0.7	N125/W105	1MX2M	000-010	1/4"				
95-2	1566		18							CCO-458/H	flake	obsidian	18	5.2	N125/W105	1MX2M	000-010	1/4"				
95-2	1579		1							CCO-458/H	flake	obsidian	1	0.4	N125/W105	1MX2M	010-020	1/4"				
95-2	1580		1							CCO-458/H	flake	obsidian	1	0.5	N125/W105	1MX2M	010-020	1/4"				
95-2	1581		1							CCO-458/H	flake	obsidian	1	0.8	N125/W105	1MX2M	010-020	1/4"				
95-2	1582		11							CCO-458/H	flake	obsidian	11	2.2	N125/W105	1MX2M	010-020	1/4"				
95-2	1596		5							CCO-458/H	flake	obsidian	5	19.8	N125/W105	1MX2M	020-030	1/4"				
95-2	1607		1							CCO-458/H	flake	obsidian	1	1.2	N125/W105	1MX2M	030-040	1/4"				
95-2	1609		13							CCO-458/H	flake	obsidian	13	2.2	N125/W105	1MX2M	030-040	1/4"				
95-2	1625		5							CCO-458/H	flake	obsidian	5	0.8	N125/W105	1MX2M	040-050	1/4"				
95-2	1642		1							CCO-458/H	flake	obsidian	1	0.3	N126/W108	1MX2M	000-010	1/4"				
95-2	1643		1							CCO-458/H	flake	obsidian	1	0.2	N126/W108	1MX2M	000-010	1/4"				
95-2	1644		1							CCO-458/H	flake	obsidian	1	0.3	N126/W108	1MX2M	000-010	1/4"				
95-2	1645		1							CCO-458/H	flake	obsidian	1	0.5	N126/W108	1MX2M	000-010	1/4"				
95-2	1646		1							CCO-458/H	flake	obsidian	1	0.3	N126/W108	1MX2M	000-010	1/4"				
95-2	1647		1							CCO-458/H	flake	obsidian	1	0.6	N126/W108	1MX2M	000-010	1/4"				
95-2	1648		1							CCO-458/H	flake	obsidian	1	0.3	N126/W108	1MX2M	000-010	1/4"				
95-2	1650		66							CCO-458/H	flake	obsidian	66	18.4	N126/W108	1MX2M	000-010	1/4"				
95-2	1667		1							CCO-458/H	flake	obsidian	1	0.1	N126/W108	1MX2M	010-020	1/4"				
95-2	1670		39							CCO-458/H	flake	obsidian	39	8.1	N126/W108	1MX2M	010-020	1/4"				
95-2	1684		1							CCO-458/H	flake	obsidian	1	0.6	N126/W108	1MX2M	020-030	1/4"				
95-2	1685		1							CCO-458/H	flake	obsidian	1	1.1	N126/W108	1MX2M	020-030	1/4"				
95-2	1686		28							CCO-458/H	flake	obsidian	28	8.8	N126/W108	1MX2M	020-030	1/4"				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-2	1703		1							CCO-458/H	flake	obsidian	1	0.2	N126/W108	1MX2M	030-040	1/4"				
95-2	1705		22							CCO-458/H	flake	obsidian	22	5.1	N126/W108	1MX2M	030-040	1/4"				
95-2	1722		1							CCO-458/H	flake	obsidian	1	0.7	N126/W108	1MX2M	040-050	1/4"				
95-2	1723		1							CCO-458/H	flake	obsidian	1	0.3	N126/W108	1MX2M	040-050	1/4"				
95-2	1724		24							CCO-458/H	flake	obsidian	24	5.8	N126/W108	1MX2M	040-050	1/4"				
95-2	1742		1							CCO-458/H	flake	obsidian	1	0.3	N126/W108	1MX2M	050-060	1/4"				
95-2	1743		22							CCO-458/H	flake	obsidian	22	6.4	N126/W108	1MX2M	050-060	1/4"				
95-2	1775		1							CCO-458/H	flake	obsidian	1	0.2	N126/W108	1MX2M	060-070	1/4"				
95-2	1776		29							CCO-458/H	flake	obsidian	29	10.3	N126/W108	1MX2M	060-070	1/4"				
95-2	1797		1							CCO-458/H	flake	obsidian	1	0.1	N126/W108	1MX2M	070-080	1/4"				
95-2	1798		8							CCO-458/H	flake	obsidian	8	1.6	N126/W108	1MX2M	070-080	1/4"				
95-2	1813		4							CCO-458/H	flake	obsidian	4	1.1	N126/W108	1MX2M	080-090	1/4"				
95-2	1828		1							CCO-458/H	flake	obsidian	1	0.7	N126/W108107	1MX2M	060-070	1/4"			1	
95-2	1829		1							CCO-458/H	flake	obsidian	1	0.1	N126/W108107	1MX2M	060-070	1/4"			1	
95-2	1830		1							CCO-458/H	flake	obsidian	1	1.7	N126/W108107	1MX2M	060-070	1/4"			1	
95-2	1831									CCO-458/H	flake	obsidian			N126/W108107	1MX2M	060-070	1/4"			1	
95-2	1832		1							CCO-458/H	flake	obsidian	1	0.8	N126/W108107	1MX2M	060-070	1/4"			1	
95-2	1845	SA 2	1	V	NV	94-H1386	2	1.6		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 2	SURF		
95-2	1846	SA 3	1	V	NV	94-H1386	3	2.5		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 3	SURF		
95-2	1847	SA 4	1	V	NV	94-H1386	4	2.4		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 4	SURF		
95-2	1849	SA 6	1	V	NV	94-H1386	6	1.9		CCO-458/H	flake	obsidian	1	1.3	SURFACE	-	000-000	-	SA 6	SURF		
95-2	1850	SA 7	1	V	NV	94-H1386	7	2.3		CCO-458/H	flake	obsidian	1	0.4	SURFACE	-	000-000	-	SA 7	SURF		
95-2	1851	SA 8	1	V	NV	94-H1386	8	2.4		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 8	SURF		
95-2	1852	SA 9	1	V	NV	94-H1386	9	2.5		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 9	SURF		
95-2	1854	SA 10B	1	V	NV	94-H1386	11	1.7		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 10B	SURF		
95-2	1855	SA 12	1	V	NV	94-H1386	12	2.1		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 12	SURF		
95-2	1856	SA 13	1	V	NV	94-H1386	13	2.5		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 13	SURF		
95-2	1859	SA 16	1	V	NV	94-H1386	16	1.2		CCO-458/H	flake	obsidian	1	0.3	SURFACE	-	000-000	-	SA 16	SURF		
95-2	1860	SA 17	1	V	NV	94-H1386	17	1.2		CCO-458/H	flake	obsidian	1	1.3	SURFACE	-	000-000	-	SA 17	SURF		
95-2	1862	SA 20B	1	V	NV	94-H1386	19	1.4		CCO-458/H	flake	obsidian	1	0.7	SURFACE	-	000-000	-	SA 20B	SURF		
95-2	1863	SA 22	1	V	CD	94-H1386	20	3.7		CCO-458/H	flake	obsidian	1	1.4	SURFACE	-	000-000	-	SA 22	SURF		
95-2	1864	SA 23	1	V	NV	94-H1386	21	1.8		CCO-458/H	flake	obsidian	1	0.2	SURFACE	-	000-000	-	SA 23	SURF		
95-2	1865	SA 24	1	V	NV	94-H1386	22	DH		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 24	SURF		
95-2	1866	SA 25	1	V	NV	94-H1386	23	2.2		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 25	SURF		
95-2	1867	SA 26	1	V	NV	94-H1386	24	4.1		CCO-458/H	flake	obsidian	1	0.4	SURFACE	-	000-000	-	SA 26	SURF		
95-2	1868	SA 27	1	V	NV	94-H1386	25	2.4		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 27	SURF		
95-2	1869	SA 28	1	V	NV	94-H1386	26	1.8		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 28	SURF		
95-2	1870	SA 29	1	V	NV	94-H1386	27	2		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 29	SURF		
95-2	1871	SA 30	1	V	NV	94-H1386	28	3.2		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 30	SURF		
95-2	1872	SA 31	1	V	NV	94-H1386	29	1.7		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 31	SURF		
95-2	1873	SA 32	1	V	NV	94-H1386	30	1.7		CCO-458/H	flake	obsidian	1	0.3	SURFACE	-	000-000	-	SA 32	SURF		
95-2	1874	SA 33A	1	V	NV	94-H1386	31	2.3		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 33A	SURF		
95-2	1875	SA 33B	1	V	NV	94-H1386	32	1.9		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 33B	SURF		
95-2	1876	SA 34A	1	V	NV	94-H1386	33	2.4		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 34A	SURF		
95-2	1877	SA 34B	1	V	NV	94-H1386	34	3.3		CCO-458/H	flake	obsidian	1	0.3	SURFACE	-	000-000	-	SA 34B	SURF		
95-2	1878	SA 35	1	V	NV	94-H1386	35	2		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 35	SURF		
95-2	1879	SA 36	1	V	NV	94-H1386	36	NVB		CCO-458/H	flake	obsidian	1	1.1	SURFACE	-	000-000	-	SA 36	SURF		
95-2	1880	SA 37	1	V	NV	94-H1386	37	1.8		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 37	SURF		
95-2	1881	SA 38	1	V	NV	94-H1386	38	1.8		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 38	SURF		
95-2	1882	SA 39	1	V	NV	94-H1386	39	1.5		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 39	SURF		
95-2	1883	SA 40	1	V	NV	94-H1386	40	2.3		CCO-458/H	flake	obsidian	1	0.1	SURFACE	-	000-000	-	SA 40	SURF		
95-2	1884	SA 41A	1	V	NV	94-H1386	41	1.9		CCO-458/H	flake	obsidian	1	4.1	SURFACE	-	000-000	-	SA 41A	SURF		
95-2	1886	SA 41C	1	V	NV	94-H1386	43	1.1		CCO-458/H	flake	obsidian	1	3	SURFACE	-	000-000	-	SA 41C	SURF		
95-2	1887	SA 41D	1	V	NV	94-H1386	44	3.2		CCO-458/H	flake	obsidian	1	0.8	SURFACE	-	000-000	-	SA 41D	SURF		
95-2	1888	SA 41E	1	V	NV	94-H1386	45	2		CCO-458/H	flake	obsidian	1	0.3	SURFACE	-	000-000	-	SA 41E	SURF		

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-2	1903		58							CCO-458/H	flake	obsidian	58	11.1	N126/W104	1MX2M	000-010	1/4"				
95-2	1920		50							CCO-458/H	flake	obsidian	50	11.4	N126/W104	1MX2M	010-020	1/4"				
95-2	1924		1							CCO-458/H	flake	obsidian	1	0.8	N126/W104	1MX2M	010-020	1/4"				
95-2	1938		27							CCO-458/H	flake	obsidian	27	10.4	N126/W104	1MX2M	020-030	1/4"				
95-2	1941		1							CCO-458/H	flake	obsidian	1	0.5	N126/W104	1MX2M	020-030	1/4"				
95-2	1955		30							CCO-458/H	flake	obsidian	30	5.8	N126/W104	1MX2M	030-040	1/4"				
95-2	1968		20							CCO-458/H	flake	obsidian	20	5.7	N126/W104	1MX2M	040-050	1/4"				
95-2	1987		1							CCO-458/H	flake	obsidian	1	0.4	N60/W60	1MX1M	000-020	1/4"				
95-2	1988		1							CCO-458/H	flake	obsidian	1	1.5	N60/W120	1MX1M	000-020	1/4"				
95-2	1991		1							CCO-458/H	flake	obsidian	1	0.1	N80/W120	1MX1M	000-020	1/4"				
95-2	1992		1							CCO-458/H	flake	obsidian	1	0.6	N90/W120	1MX1M	000-020	1/4"				
95-2	1993		4							CCO-458/H	flake	obsidian	4	1.8	N90/W120	1MX1M	000-020	1/4"				
95-2	1997		1							CCO-458/H	flake	obsidian	1	0.4	N100/W110	1MX1M	000-020	1/4"				
95-2	1999		1							CCO-458/H	flake	obsidian	1	0.2	N100/W110	1MX1M	000-020	1/4"				
95-2	2000		7							CCO-458/H	flake	obsidian	7	3.7	N100/W110	1MX1M	000-020	1/4"				
95-2	2011		1							CCO-458/H	flake	obsidian	1	0.05	N110/W80	1MX1M	000-020	1/4"				
95-2	2017		1							CCO-458/H	flake	obsidian	1	1.5	N110/W130	1MX1M	000-020	1/4"				
95-2	2018		17							CCO-458/H	flake	obsidian	17	3.5	N110/W130	1MX1M	000-020	1/4"				
95-2	2029		1							CCO-458/H	flake	obsidian	1	0.2	N120/E30	1MX1M	000-020	1/4"				
95-2	2036		1							CCO-458/H	flake	obsidian	1	0.6	N120/E60	1MX1M	000-020	1/4"				
95-2	2044		21							CCO-458/H	flake	obsidian	21	5.7	N120/W90	1MX1M	000-020	1/4"				
95-2	2062		1							CCO-458/H	flake	obsidian	1	0.8	N130/W100	1MX1M	000-020	1/4"				
95-2	2063		1							CCO-458/H	flake	obsidian	1	0.4	N130/W100	1MX1M	000-020	1/4"				
95-2	2064		1							CCO-458/H	flake	obsidian	1	0.1	N130/W100	1MX1M	000-020	1/4"				
95-2	2065		1							CCO-458/H	flake	obsidian	1	0.4	N130/W100	1MX1M	000-020	1/4"				
95-2	2066		1							CCO-458/H	flake	obsidian	1	0.1	N130/W100	1MX1M	000-020	1/4"				
95-2	2067		1							CCO-458/H	flake	obsidian	1	0.4	N130/W100	1MX1M	000-020	1/4"				
95-2	2068		1							CCO-458/H	flake	obsidian	1	0.9	N130/W100	1MX1M	000-020	1/4"				
95-2	2069		1							CCO-458/H	flake	obsidian	1	1.9	N130/W100	1MX1M	000-020	1/4"				
95-2	2070		1							CCO-458/H	flake	obsidian	1	2.3	N130/W100	1MX1M	000-020	1/4"				
95-2	2072		32							CCO-458/H	flake	obsidian	32	7.3	N130/W100	1MX1M	000-020	1/4"				
95-2	2085		1							CCO-458/H	flake	obsidian	1	0.2	N120/W120	1MX1M	000-020	1/4"				
95-2	2086		40							CCO-458/H	flake	obsidian	40	12.7	N120/W120	1MX1M	000-020	1/4"				
95-2	2098		1							CCO-458/H	flake	obsidian	1	0.5	N130/W80	1MX1M	000-020	1/4"				
95-2	2100		7							CCO-458/H	flake	obsidian	7	2.5	N130/W80	1MX1M	000-020	1/4"				
95-2	2109		2							CCO-458/H	flake	obsidian	2	0.4	N140/W70	1MX1M	000-020	1/4"				
95-2	2115		12							CCO-458/H	flake	obsidian	12	3.9	N140/W110	1MX1M	000-020	1/4"				
95-2	2128		2							CCO-458/H	flake	obsidian	2	0.5	N150/W90	1MX1M	000-020	1/4"				
95-2	2135		6							CCO-458/H	flake	obsidian	6	3.6	N150/W120	1MX1M	000-020	1/4"				
95-2	2149		8							CCO-458/H	flake	obsidian	8	3	N160/W110	1MX1M	000-020	1/4"				
95-2	2163		1							CCO-458/H	flake	obsidian	1	0.1	N180/W0	1MX1M	000-020	1/4"				
95-2	2171		1							CCO-458/H	flake	obsidian	1	0.2	N180/W90	1MX1M	000-020	1/4"				
95-2	2174		1							CCO-458/H	flake	obsidian	1	0.1	N210/W0	1MX1M	000-020	1/4"				
95-2	2197	SA-41	3							CCO-458/H	flake	obsidian	3	0.2	SURFACE	-	000-000	-	SA-41	SURF		
95-2	2199	SA-43	1							CCO-458/H	flake	obsidian	1	0.2	SURFACE	-	000-000	-	SA-43	SURF		
95-2	2208		1	V	NV					CCO-458/H	flake	obsidian	1	0.1	N126/W110	1MX2M	010-020	1/4"				
95-2	2209		1							CCO-458/H	flake	obsidian	1	2.3	N126/W110	1MX2M	010-020	1/4"				
95-2	2210		1	V	NV					CCO-458/H	flake	obsidian	1	0.5	N126/W110	1MX2M	010-020	1/4"				
95-2	2211		1	V	NV					CCO-458/H	flake	obsidian	1	0.5	N126/W110	1MX2M	010-020	1/4"				
95-2	2213		1	V	NV					CCO-458/H	flake	obsidian	1	0.7	N126/W110	1MX2M	010-020	1/4"				
95-2	2214		1	V	NV					CCO-458/H	flake	obsidian	1	2.4	N126/W110	1MX2M	010-020	1/4"				
95-2	2215	A	4	V	NV					CCO-458/H	flake	obsidian	25	23.4	N126/W110	1MX2M	010-020	1/4"				
95-2	2215	B	9	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	010-020	1/4"				
95-2	2215	C	5	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	010-020	1/4"				
95-2	2215	D	4	V	BH					CCO-458/H	flake	obsidian			N126/W110	1MX2M	010-020	1/4"				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-2	2215	E	2	V	AN?					CCO-458/H	flake	obsidian			N126/W110	1MX2M	010-020	1/4"				
95-2	2215	F	1	IND.																		
95-2	2236		1	V	NV					CCO-458/H	flake	obsidian	1	1.7	N126/W110	1MX2M	020-030	1/4"				
95-2	2237		1	V	NV					CCO-458/H	flake	obsidian	1	0.3	N126/W110	1MX2M	020-030	1/4"				
95-2	2238	A	7	V	NV					CCO-458/H	flake	obsidian	29	5.7	N126/W110	1MX2M	020-030	1/4"				
95-2	2238	B	7	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	020-030	1/4"				
95-2	2238	C	12	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	020-030	1/4"				
95-2	2238	D	3	V	BH?,IND.					CCO-458/H	flake	obsidian			N126/W110	1MX2M	020-030	1/4"				
95-2	2255		1							CCO-458/H	flake	obsidian	1	0.2	N126/W110	1MX2M	030-040	1/4"				
95-2	2256		1	V	NV					CCO-458/H	flake	obsidian	1	0.5	N126/W110	1MX2M	030-040	1/4"				
95-2	2257	A	1	V	NV					CCO-458/H	flake	obsidian	37	10.1	N126/W110	1MX2M	030-040	1/4"				
95-2	2257	B	1	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	C	1	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	D	1	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	E	1	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	F	1	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	G	1	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	H	1	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	I	1	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	J	1	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	K	9	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	L	5	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2257	M	13	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	030-040	1/4"				
95-2	2271	A	6	V	NV					CCO-458/H	flake	obsidian	25	7.1	N126/W110	1MX2M	040-050	1/4"				
95-2	2271	B	16	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	040-050	1/4"				
95-2	2271	C	3	V	BH?					CCO-458/H	flake	obsidian			N126/W110	1MX2M	040-050	1/4"				
95-2	2284	A	8	V	NV					CCO-458/H	flake	obsidian	18	5.1	N126/W110	1MX2M	050-060	1/4"				
95-2	2284	B	4	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	050-060	1/4"				
95-2	2284	C	4	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	050-060	1/4"				
95-2	2284	D	1	V	BH					CCO-458/H	flake	obsidian			N126/W110	1MX2M	050-060	1/4"				
95-2	2284	E	1	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	050-060	1/4"				
95-2	2297		7	V	NV					CCO-458/H	flake	obsidian	8	1.3	N126/W110	1MX2M	060-070	1/4"				
95-2	2312	A	1	V	NV					CCO-458/H	flake	obsidian	7	1.6	N126/W110	1MX2M	070-080	1/4"				
95-2	2312	B	5	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	070-080	1/4"				
95-2	2312	C	1	V	BH					CCO-458/H	flake	obsidian			N126/W110	1MX2M	070-080	1/4"				
95-2	2328		1	V	NV					CCO-458/H	flake	obsidian	1	0.5	N126/W110	1MX2M	080-090	1/4"				
95-2	2329	A	5	V	NV					CCO-458/H	flake	obsidian	6	1.2	N126/W110	1MX2M	080-090	1/4"				
95-2	2329	B	1	V	IND.					CCO-458/H	flake	obsidian			N126/W110	1MX2M	080-090	1/4"				
95-2	2345		7	V	NV					CCO-458/H	flake	obsidian	7	2	N126/W110	1MX2M	090-100	1/4"				
95-2	2355		1							CCO-458/H	flake	obsidian	1	0.5	N126/W110	1MX2M	100-110	1/4"				
95-2	2356		1	V	NV					CCO-458/H	flake	obsidian	1	0.5	N126/W110	1MX2M	100-110	1/4"				
95-2	2357	A	1	V	NV	95-H1544	13	1.9		CCO-458/H	flake	obsidian	1	1.7	N126/W110	1MX2M	100-110	1/4"				
95-2	2357	B	1	V	NV	95-H1544	14	1.5		CCO-458/H	flake	obsidian	1	0.3	N126/W110	1MX2M	100-110	1/4"				
95-2	2357	C	1	V	NV	95-H1544	15	NVB		CCO-458/H	flake	obsidian	1	0.3	N126/W110	1MX2M	100-110	1/4"				
95-2	2357	D	1	V	NV	95-H1544	16	1.6		CCO-458/H	flake	obsidian	1	0.3	N126/W110	1MX2M	100-110	1/4"				
95-2	2357	E	1	V	NV	95-H1544	17	2.8		CCO-458/H	flake	obsidian	1	0.3	N126/W110	1MX2M	100-110	1/4"				
95-2	2357	F	1	V	NV	95-H1544	18	1		CCO-458/H	flake	obsidian	1	0.3	N126/W110	1MX2M	100-110	1/4"				
95-2	2369		1	V	NV					CCO-458/H	flake	obsidian	1	1.9	N126/W110	1MX2M	110-120	1/4"				
95-2	2370	A	2	V	NV					CCO-458/H	flake	obsidian	5	1.1	N126/W110	1MX2M	110-120	1/4"				
95-2	2370	B	3	V	NV					CCO-458/H	flake	obsidian			N126/W110	1MX2M	110-120	1/4"				
95-2	2383		1	V	NV	95-H1544	19	1.3		CCO-458/H	flake	obsidian	1	0.6	N126/W110	1MX2M	120-130	1/4"				
95-2	2384		1	V	BH					CCO-458/H	flake	obsidian	1	0.3	N126/W110	1MX2M	120-130	1/4"				
95-2	2396		1	V	NV	95-H1544	20	1.1		CCO-458/H	flake	obsidian	1	0.3	N126/W110	1MX2M	130-140	1/4"				
95-2	2396		1	V	NV	95-H1544	21	2	4.4	CCO-458/H	flake	obsidian	1	0.3	N126/W110	1MX2M	130-140	1/4"				
95-2	2407		2	V	NV					CCO-458/H	flake	obsidian	2	0.4	N126/W110	1MX2M	140-150	1/4"				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-2	2424		1							CCO-458/H	flake	obsidian	1	0.2	N190/E20	1MX1M	000-020	1/4"				
95-2	2435		1							CCO-458/H	flake	obsidian	1	0.3	N126/W108107	-	060-090	1/4"	EXP		1	
95-2	2436		1							CCO-458/H	flake	obsidian	1	1.6	N126/W108107	-	060-090	1/4"	EXP		1	
95-2	2437		1							CCO-458/H	flake	obsidian	1	0.4	N126/W108107	-	060-090	1/4"	EXP		1	
95-2	2438		12							CCO-458/H	flake	obsidian	12	4.5	N126/W108107	-	060-090	1/4"	EXP		1	
95-2	2459		1							CCO-458/H	flake	obsidian	1	0.3	N122/W110109	1MX2M	999-999	1/4"			9	
95-2	2460		2							CCO-458/H	flake	obsidian	2	0.4	N122/W110109	1MX2M	999-999	1/4"			9	
95-2	2528		1	V	NV					CCO-458/H	flake	obsidian	1	0.05								
95-2	2562	SA-44	1							CCO-458/H	flake	obsidian	1	0.4	SURFACE	-	000-000	-	SA-45	SURF		
95-2	2563	SA-45	1							CCO-458/H	flake	obsidian	1	0.7	SURFACE	-	000-000	-	SA-46	SURF		
95-2	2567	SA-48	1							CCO-458/H	flake	obsidian	1	2.1	SURFACE	-	000-000	-	SA-49	SURF		
95-2	2587		11							CCO-458/H	flake	obsidian	11	1.8	N126/W104	1MX2M	050-060	1/4"				
95-2	2596		1							CCO-458/H	flake	obsidian	1	0.05	N126/W104	1MX2M	050-060	1/4"				
95-2	2612		1	V	NV					CCO-458/H	flake	obsidian	1	0.2	N176/E20	.5MX2M	000-020	1/4"				
95-2	2616	A	1	V	BH					CCO-458/H	flake	obsidian	3	1.1	N176/E20	.5MX2M	000-020	1/4"				
95-2	2616	B	1	V	NV					CCO-458/H	flake	obsidian			N176/E20	.5MX2M	000-020	1/4"				
95-2	2616	C	1	V	NV					CCO-458/H	flake	obsidian			N180/E10	.5MX2M	000-020	1/4"				
95-2	2619		1	V	NV					CCO-458/H	flake	obsidian	1	1.1	N184/E20	.5MX2M	000-020	1/4"				
95-2	2620	A	1	V	NV					CCO-458/H	flake	obsidian	2	0.8	N184/E20	.5MX2M	000-020	1/4"				
95-2	2620	B	1	V	BH					CCO-458/H	flake	obsidian			N186/E10	.5MX2M	000-020	1/4"				
95-2	2624		1	V	NV					CCO-458/H	flake	obsidian	1	1.2	N192/E10	.5MX2M	000-020	1/4"				
95-2	2646		1	V	NV					CCO-458/H	flake	obsidian	1	0.1	N202/E20	.5MX2M	000-020	1/4"				
95-2	2660	A	2	V	NV					CCO-458/H	flake	obsidian	2	0.6	N204/E10	.5MX2M	000-020	1/4"				
95-2	2660	B		V	NV					CCO-458/H	flake	obsidian			N202/E10	.5MX2M	000-020	1/4"				
95-2	2670		1	V	NV					CCO-458/H	flake	obsidian	1	0.4	N196/E20	1X2M	010-020	1/4"				
95-2	2691	A	1	V	NV					CCO-458/H	flake	obsidian			N196/E20	1X2M	010-020	1/4"				
95-2	2691	B	1	V	NV					CCO-458/H	flake	obsidian			N196/E20	1X2M	010-020	1/4"				
95-2	2691	C	1	V	NV					CCO-458/H	flake	obsidian			N196/E20	1X2M	040-050	1/4"				
95-2	2701	A	1	V	BL					CCO-458/H	flake	obsidian	2	0.4	N196/E20	1X2M	050-060	1/4"				
95-2	2701	B	1	V	BH					CCO-458/H	flake	obsidian			N196/E20	1X2M	060-070	1/4"				
95-2	2714		1	V	NV					CCO-458/H	flake	obsidian	1	0.3	N200/E20	1X2M	010-020	1/4"				
95-2	2716		1	V	NV					CCO-458/H	flake	obsidian	1	0.4	N200/E20	1X2M	020-030	1/4"				
95-2	2725		1	V	NV					CCO-458/H	flake	obsidian	1	0.9	N200/E20	1X2M	030-040	1/4"				
95-2	2727	A	2	V	NV					CCO-458/H	flake	obsidian	2	0.7	N200/E20	1X2M	030-040	1/4"				
95-2	2727	B		V	NV					CCO-458/H	flake	obsidian			N200/E20	1X2M	050-060	1/4"				
95-2	2738	A	2	V	NV					CCO-458/H	flake	obsidian	2	0.3	N200/E20	1X2M	050-060	1/4"				
95-2	2738	B		V	NV					CCO-458/H	flake	obsidian			N200/E20	1MX2M	040-050	1/4"				
95-2	2753		1	V	NV					CCO-458/H	flake	obsidian	1	0.2	N204/E20	1MX2M	010-020	1/4"				
95-2	2767		1	V	NV					CCO-458/H	flake	obsidian	1	0.7	N204/E20	1MX2M	030-040	1/4"				
95-2	2776		1	V	NV					CCO-458/H	flake	obsidian	1	0.3	N204/E20	1MX2M	040-050	1/4"				
95-2	2786		1	V	NV	95-H1544	30	2.4		CCO-458/H	flake	obsidian	1	0.2	N204/E20	1MX2M	060-070	1/4"				
95-2	2789		1	V	NV	95-H1544	31	3.9		CCO-458/H	flake	obsidian	1	1.3	N204/E20	1MX2M	060-070	1/4"				
95-2	2796		10							CCO-458/H	flake	obsidian	10	1.7	-	-		-	BURMTX		B-2	
95-3	34	X	1	V	NV	94-H-1387-	10	2.1		CCO-459	flake	obsidian	1	0.6	N1.5/E5	1MX2M	020-030	1/4"				
95-3	41		1	V	NV					CCO-459	flake	obsidian	1	0.05	N1.5/E5	1MX2M	030-040	1/4"				
95-3	46		1	V	NV					CCO-459	flake	obsidian	1	0.4	N1.5/E5	1MX2M	040-050	1/4"				
95-3	58	Q	1	V	NV	94-H-1387-	3	DH		CCO-459	flake	obsidian	1	0.3	N0/E5	1MX2M	000-010	1/4"				
95-3	58	R	1	V	NV	94-H-1387-	4	1.8		CCO-459	flake	obsidian	1	0.3	N0/E5	1MX2M	000-010	1/4"				
95-3	64	O	1	V	NV	94-H-1387-	1	2.0		CCO-459	flake	obsidian	1	0.2	-	1MX2M	000-010	1/4"				STRT A
95-3	106		1	V	NV					CCO-459	flake	obsidian	1	0.1	S1/E5	1MX2M	000-010	1/4"				
95-3	126	P	1	V	NV	94-H-1387-	2	2.4		CCO-459	flake	obsidian	1	0.9	S2/W0	1MX2M	040-050	1/4"				
95-3	130	T	1	V	NV	94-H-1387-	6	1.7		CCO-459	flake	obsidian	1	5.8	S2/E5	1MX2M	000-010	1/4"				
95-3	130	U	1	V	NV	94-H-1387-	7	1.3		CCO-459	flake	obsidian	1	5.8	S2/E5	1MX2M	000-010	1/4"				
95-3	130	V	1	V	NV	94-H-1387-	8	5.2		CCO-459	flake	obsidian	1	5.8	S2/E5	1MX2M	000-010	1/4"				
95-3	145	S	1	V	NV	94-H-1387-	5	2.7		CCO-459	flake	obsidian	1	0.1	-	-		-				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-3	158		1	V	NV					CCO-459	flake	obsidian	1	0.5	-	-		-				
95-3	159	A	1	V	NV					CCO-459	flake	obsidian	1	0.6	-	-		-				
95-3	159	B	1	V	NV					CCO-459	flake	obsidian	1	0.6	-	-		-				
95-3	159	C	1	V	NV					CCO-459	flake	obsidian	1	0.6	-	-		-				
95-3	168	Y	1	V	NV	94-H-1387-	11	3.4		CCO-459	flake	obsidian	1	0.1	-	-		-				
95-3	175	A	1	V	NV					CCO-459	flake	obsidian	1	0.6	-	-		-				
95-3	175	B	1	V	NV					CCO-459	flake	obsidian	1	0.6	-	-		-				
95-3	175	C	1	V	NV					CCO-459	flake	obsidian	1	0.6	-	-		-				
95-6	16	DD	1	V	NV	94-H1389	5	2.6		CCO-636	flake	obsidian	1	0.1	SURFACE	-	000-000	-				
95-6	26		1	V	NV					CCO-636	flake	obsidian	1	0.1	N10/W0	1MX1M	000-020	1/4"				
95-6	36	Z	1	V	NV	94-H1389	1	1.2		CCO-636	flake	obsidian	1	0.5	N50/W0	1MX1M	000-020	1/4"				
95-6	40	AA	1	V	NV	94-H1389	2	2.6		CCO-636	flake	obsidian	1	0.1	S10/W0	1MX1M	000-020	1/4"				
95-6	48	FF	1	V	NV	94-H1389	7	2.4		CCO-636	flake	obsidian	1	0.1	-	-	000-000	-	FEAT 1			
95-6	48	GG	1	V	NV	94-H1389	8	2.1		CCO-636	flake	obsidian	1	0.1	-	-	000-000	-	FEAT 1			
95-6	55	HH	1	V	NV	94-H1389	9	2.0		CCO-636	flake	obsidian	1	0.1	-	-	000-000	-	FEAT 1			
95-6	58	EE	1	V	BH	94-H1389	6	2.6		CCO-636	flake	obsidian	1	0.4	-	-	040-050	-	T-7			
95-6	59		1	V	NV					CCO-636	flake	obsidian	1	0.1	-	-	040-050	-	T-7			
95-7	20	C	1	V	BH	94-H1390	3	2.1		CCO-637	flake	obsidian	1	1.9	S20/W0	.5MX2M	060-080	1/4"				
95-7	20	D	1	V	NV	94-H1390	4	3.6		CCO-637	flake	obsidian	1	1.9	S20/W0	.5MX2M	060-080	1/4"				
95-7	42	G	1	V	NV	94-H1390	7	3.7		CCO-637	flake	obsidian	1	0.4	S10/W0	1MX2M	000-010	1/4"				
95-7	45	F	1	V	NV	94-H1390	6	3.7		CCO-637	flake	obsidian	1	0.2	S10/W0	1MX2M	030-040	1/4"				
95-7	48	E	1	V	NV	94-H1390	5	3.6		CCO-637	flake	obsidian	1	0.1	S10/W0	1MX2M	040-050	1/4"				
95-7	49		1	V	NV					CCO-637	flake	obsidian	1	0.4	S10/W0	1MX2M	040-050	1/4"				
95-7	71	A	1	V	NV	94-H1390	1	1.3	2.4	CCO-637	flake	obsidian	1	0.2	-	-		-				
95-7	72	B	1	V	BH	94-H1390	2	3.6		CCO-637	flake	obsidian	1	0.5	-	-		-				
95-7	73	H	1	V	NV	94-H1390	8	3.6		CCO-637	flake	obsidian	2	0.05	-	-		-				
95-7	74	J	1	V	NV	94-H1390	9	3.2		CCO-637	flake	obsidian	1	0.1	-	-		-				
95-7	80		1	XRF	NV	96-H1518	2	2.1		CCO-637	flake	obsidian	1	1.4	S27/W3	1MX2M	070-080	1/4"				
95-7	82		1	XRF	NV	96-H1518	3	2.2		CCO-637	flake	obsidian	1	0.8	S27/W3	1MX2M	070-080	1/4"				
95-7	99	A	1	XRF	NV	96-H1518	4	2.2		CCO-637	flake	obsidian	1	0.2	S27/W3	1MX2M	090-100	1/4"				
95-7	99	B	1	XRF	CD	96-H1518	5	2.6		CCO-637	flake	obsidian	1	0.3	S27/W3	1MX2M	090-100	1/4"				
95-7	109		1	V	BH	96-H1507	1	2.8		CCO-637	flake	obsidian	1	0.1	S27/W3	1MX2M	100-110	1/4"				
95-7	115		1	V	NV	96-H1507	2	3.0		CCO-637	flake	obsidian	1	0.3	S27/W3	1MX2M	110-120	1/4"				
95-7	121	A	1	XRF	NV	96-H1518	6	2.6		CCO-637	flake	obsidian	1	0.4	S27/W3	1MX2M	120-130	1/4"				
95-7	121	B	1	XRF	AN	96-H1518	7	1.1		CCO-637	flake	obsidian	1	0.5	S27/W3	1MX2M	120-130	1/4"				
95-7	139		1	XRF	NV	96-H1518	8,9	2.7	4.7	CCO-637	flake	obsidian	1	0.9	S27/W3	1MX2M	140-150	1/4"				
95-7	148	A	1	XRF	BH	96-H1518	15	2.9	5.9	CCO-637	flake	obsidian	1	1.3	S29/W3	1MX2M	070-080	1/4"				
95-7	148	B	1	V	NV	96-H1507	3	4.2		CCO-637	flake	obsidian	1	1.3	S29/W3	1MX2M	070-080	1/4"				
95-7	161		1	V	NV	96-H1507	4	3.0		CCO-637	flake	obsidian	1	0.1	S29/W3	1MX2M	090-100	1/4"				
95-7	183		1	XRF	BH	96-H1518	16	3.2		CCO-637	flake	obsidian	1	1.5	S31/W3	1MX2M	055-070	1/4"				
95-7	185		1	XRF	BH	96-H1518	17	3.5		CCO-637	flake	obsidian	1	0.5	S31/W3	1MX2M	070-080	1/4"				
95-7	186		1	V	BH	96-H1507	5	2.8		CCO-637	flake	obsidian	1	0.2	S31/W3	1MX2M	070-080	1/4"				
95-7	193		1	V	NV	96-H1507	6	1.5		CCO-637	flake	obsidian	1	0.2	S31/W3	1MX2M	080-090	1/4"				
95-7	202		1	V	NV	96-H1507	7	1.6		CCO-637	flake	obsidian	1	0.2	S31/W3	1MX2M	090-100	1/4"				
95-7	212		1	XRF	BH	96-H1518	18	1.9	2.2	CCO-637	flake	obsidian	1	0.2	S31/W3	1MX2M	110-120	1/4"				
95-7	220	A	1	XRF	NV	96-H1518	19	3.4		CCO-637	flake	obsidian	1	0.4	S31/W3	1MX2M	120-130	1/4"				
95-7	220	B	1	V	NV	96-H1507	8	2.4		CCO-637	flake	obsidian	1	0.4	S31/W3	1MX2M	120-130	1/4"				
95-7	220	C	1	XRF	NV	96-H1518	20	2.6		CCO-637	flake	obsidian	1	0.4	S31/W3	1MX2M	120-130	1/4"				
95-7	220	D	1	XRF	NV	96-H1518	21	3.3		CCO-637	flake	obsidian	1	0.4	S31/W3	1MX2M	120-130	1/4"				
95-7	220	E	1	XRF	NV	96-H1518	22	1.9		CCO-637	flake	obsidian	1	0.4	S31/W3	1MX2M	120-130	1/4"				
95-7	220	F	1	V	NV	96-H1507	9	2.2		CCO-637	flake	obsidian	1	0.4	S31/W3	1MX2M	120-130	1/4"				
95-7	228		1	XRF	NV	96-H1518	23	2.3		CCO-637	flake	obsidian	1	0.4	S31/W3	1MX2M	130-140	1/4"				
95-7	243		1	XRF	BH	96-H1518	9	3.5		CCO-637	flake	obsidian	1	2.5	S33/W3	1MX2M	080-090	1/4"				
95-7	253	A	1	V	NV	96-H1507	10	4.7		CCO-637	flake	obsidian	2	0.5	S33/W3	1MX2M	090-100	1/4"				
95-7	253	B	1	XRF	NV	96-H1518	10	2.5		CCO-637	flake	obsidian	2	0.5	S33/W3	1MX2M	090-100	1/4"				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-7	258		1	XRF	NV	96-H1518	11	2.3		CCO-637	flake	obsidian	1	0.8	S33/W3	1MX2M	100-110	1/4"				
95-7	269	A	1	XRF	NV	96-H1518	12	2.3		CCO-637	flake	obsidian	1	1.4	S33/W3	1MX2M	110-120	1/4"				
95-7	269	B	1	XRF	NV	96-H1518	13	2.2		CCO-637	flake	obsidian	1	1.4	S33/W3	1MX2M	110-120	1/4"				
95-7	269	C	1	XRF	NV	96-H1518	14	VW		CCO-637	flake	obsidian	1	1.3	S33/W3	1MX2M	110-120	1/4"				
95-7	274	A	1	V	NV	96-H1507	11	4.4		CCO-637	flake	obsidian	1	0.1	S33/W3	1MX2M	120-130	1/4"				
95-7	274	B	1	V	NV	96-H1507	12	3.0		CCO-637	flake	obsidian	1	0.3	S33/W3	1MX2M	120-130	1/4"				
95-7	303	HH	1	XRF	NV	95-H1390	10	3.2		CCO-637	flake	obsidian	1		TR4-27-1	-	060-080	1/4"	4-8M			
95-7	303	II	1	XRF	NV	95-H1390	11	1.6		CCO-637	flake	obsidian	1		TR4-27-1	-	060-080	1/4"	4-8M			
95-7	303	JJ	1	XRF	NV	95-H1390	12	4.6		CCO-637	flake	obsidian	1		TR4-27-1	-	060-080	1/4"	4-8M			
95-7	313	CC	1	XRF	BH	95-H1390	13	2.7		CCO-637	flake	obsidian	1		TR4-27-1	-	060-080	-	8-12M			
95-7	324	DD	1	XRF	NV	95-H1390	14	DH		CCO-637	flake	obsidian	1		TR4-27-1	-	060-080	1/4"	12-16M			
95-7	324	EE	1	XRF	NV	95-H1390	15	4.0		CCO-637	flake	obsidian	1		TR4-27-1		060-080	1/4"	12-16M			
95-7	324	FF	1	XRF	NV	95-H1390	16	3.4		CCO-637	flake	obsidian	1		TR4-27-1		060-080	1/4"	12-16M			
95-7	332	V	1	XRF	NV	95-H1390	17	1.4		CCO-637	flake	obsidian	1		TR4-27-1		060-080	1/4"	16-20M			
95-7	332	W	1	V	NV	95-H1390	18	2.0		CCO-637	flake	obsidian	1		TR4-27-1		060-080	1/4"	16-20M			
95-7	332	X	1	V	NV	95-H1390	19	3.1		CCO-637	flake	obsidian	1		TR4-27-1		060-080	1/4"	16-20M			
95-7	341	AA	1	V	NV	95-H1390	22	2.4		CCO-637	flake	obsidian	1		TR4-27-1	-	060-080	1/4"	20-24M			
95-7	341	BB	1	V	NV	95-H1390	23	2.9		CCO-637	flake	obsidian	1		TR4-27-1	-	060-080	1/4"	20-24M			
95-7	341	Y	1	V	NV	95-H1390	20	2.7		CCO-637	flake	obsidian	1		TR4-27-1	-	060-080	1/4"	20-24M			
95-7	341	Z	1	XRF	NV	95-H1390	21	DH		CCO-637	flake	obsidian	1		TR4-27-1	-	060-080	1/4"	20-24M			
95-8	1		1	V	NV	96-H1519	2	2.5		CCO-696	flake	obsidian	1	0.2	-	-	120	1/4"	BURMTX		B-26	
95-8	16		1	V	NV					CCO-696	flake	obsidian	1	0.1	-	-	101	1/4"	BURMTX		B-31	
95-8	28		1	XRF	AN	96-H1519	3	1.1		CCO-696	flake	obsidian	1	0.9	-	-	118	1/4"	BURMTX		B-33	
95-8	32		2	V	NV					CCO-696	flake	obsidian	2	2.4	-	-	118	1/4"	EXPMTX		B-33+	
95-8	51		1	V	AN					CCO-696	flake	obsidian	1	0.4	-	-	117	1/4"	EXPMTX		B-35+	
95-8	69		1	XRF	NV	96-H1519	5	2.8		CCO-696	flake	obsidian	1	1.3	-	-	107	1/4"	BURMTX		B-43	
95-8	71	A	1	XRF	NV	96-H1519	6	2.6		CCO-696	flake	obsidian	1	0.6	-	-	111	1/4"	BURMTX		B-45	
95-8	71	B	1	XRF	NV	96-H1519	7	2.5		CCO-696	flake	obsidian	1	0.6	-	-	111	1/4"	BURMTX		B-45	
95-8	71	C	1	V	NV					CCO-696	flake	obsidian	1	0.6	-	-	111	1/4"	BURMTX		B-45	
95-8	77		1	XRF	NV	96-H1519	8	2.7		CCO-696	flake	obsidian	1	0.4	-	-	119	1/4"	BURMTX		B-54	
95-8	78	A	1	XRF	BL	96-H1519	9	3.1		CCO-696	flake	obsidian	1	0.7	-	-	119	1/4"	BURMTX		B-54	
95-8	78	B	1	XRF	BL	96-H1519	10	3.2		CCO-696	flake	obsidian	1	0.8	-	-	119	1/4"	BURMTX		B-54	
95-8	79	A	1	V	BL	96-H1508	1	3.3		CCO-696	flake	obsidian	1	1	-	-	119	1/4"	BURMTX		B-54	
95-8	79	B	1	V	BL	96-H1508	2	3.3		CCO-696	flake	obsidian	1	1	-	-	119	1/4"	BURMTX		B-54	
95-8	79	C	1	V	BL	96-H1508	3	4.3		CCO-696	flake	obsidian	1	1	-	-	119	1/4"	BURMTX		B-54	
95-8	79	D	1	V	NV	96-H1508	4	2.0		CCO-696	flake	obsidian	1	1	-	-	119	1/4"	BURMTX		B-54	
95-8	104		1	V	BH					CCO-696	flake	obsidian	1	0.2	-	-	115	1/4"	BURMTX		B-72	
95-8	116		1	XRF	BH	96-H1519	11	3.0		CCO-696	flake	obsidian	1	1.2	-	-	118	1/4"	BURMTX		B-81	
95-8	124		1	V	NV	96-H1508	5	4.1		CCO-696	flake	obsidian	1	0.1	-	-	119	1/4"	BURMTX		B-83	
95-8	199		2	V	NV					CCO-696	flake	obsidian	2	1.1	-	-	132	1/4"	BURMTX		B-119	
95-8	199	A	1	XRF	NV	96-H1519	14	4.1		CCO-696	flake	obsidian	1	1.1	-	-	132	1/4"	BURMTX		B-119	
95-8	204	A	1	V	BH	96-H1508	6	2.2		CCO-696	flake	obsidian	1	0.2	S3/W2	2MX2M	090-100	1/4"	EXPMTX		B-12	
95-8	204	B	1	V	NV	96-H1508	7	2.0		CCO-696	flake	obsidian	1	0.2	S3/W2	2MX2M	090-100	1/4"	EXPMTX		B-12	
95-8	204	C	1	V	NV					CCO-696	flake	obsidian	1	0.2	S3/W2	2MX2M	090-100	1/4"	EXPMTX		B-12	
95-8	205		1	V	NV	96-H1508	8	3.8		CCO-696	flake	obsidian	1	0.1	S3/W2	2MX2M	090-100	1/4"	EXPMTX		B-12	
95-8	216		3	V	NV,BH					CCO-696	flake	obsidian	3	0.7	S3/W2	2MX2M	103	1/4"	EXPMTX		B-6+	
95-8	230		1	V	NV					CCO-696	flake	obsidian	1	0.1	N0/W2	2MX2M	106	1/4"	EXPMTX		B-5	
95-8	237		2	V	NV					CCO-696	flake	obsidian	2	0.4	-	-	080-090	1/4"	EXPMTX		B-15	BD"A"
95-8	249	A	1	V	NV	96-H1508	9	2.5		CCO-696	flake	obsidian	1	0.2	-	-	113	1/4"	EXPMTX		B-16+	
95-8	249	B	1	V	NV	96-H1508	10	4.7		CCO-696	flake	obsidian	1	0.2	-	-	113	1/4"	EXPMTX		B-16+	
95-8	249	C	1	V	NV	96-H1508	11	2.5		CCO-696	flake	obsidian	1	0.2	-	-	113	1/4"	EXPMTX		B-16+	
95-8	249	D	1	V	NV	96-H1508	12	3.9		CCO-696	flake	obsidian	1	0.2	-	-	113	1/4"	EXPMTX		B-16+	
95-8	249	E	1	V	NV					CCO-696	flake	obsidian	1	0.2	-	-	113	1/4"	EXPMTX		B-16+	
95-8	249	F	1	V	NV					CCO-696	flake	obsidian	1	0.2	-	-	113	1/4"	EXPMTX		B-16+	
95-8	249	G	1	V	NV					CCO-696	flake	obsidian	1	0.2	-	-	113	1/4"	EXPMTX		B-16+	

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-8	249	H	1	V	BH	96-H1508	13	4.9		CCO-696	flake	obsidian	1	0.2	-	-	113	1/4"	EXPMTX		B-16+	
95-8	258		2	V	NV					CCO-696	flake	obsidian	2	0.2			100	1/4"	EXPMTX		B-17	
95-8	258	A	1	XRF	NV	96-H1519	15	4.5		CCO-696	flake	obsidian	1	0.7			100	1/4"	EXPMTX		B-17	
95-8	264	A	1	V	NV					CCO-696	flake	obsidian	1	0.1	-		110	1/4"	EXPMTX		B-18	
95-8	264	B	1	XRF	NV	96-H1519	16	2.7		CCO-696	flake	obsidian	1	0.1	-		110	1/4"	EXPMTX		B-18	
95-8	264	C	1	XRF	NV	96-H1519	17	2.9	3.4	CCO-696	flake	obsidian	1	0.2	-		110	1/4"	EXPMTX		B-18	
95-8	300	A	1	V	NV	96-H1508	14	4.0		CCO-696	flake	obsidian	1	0.2	-		109	1/4"	EXPMTX		B-30	
95-8	300	B	1	V	BH?					CCO-696	flake	obsidian	1	0.1	-		109	1/4"	EXPMTX		B-30	
95-8	313		1	V	NV					CCO-696	flake	obsidian	1	0.2	-		119	1/4"	BURMTX		B-37	
95-8	322		1	V	NV	96-H1508	15	2.1		CCO-696	flake	obsidian	1	0.05		-	114	1/4"	EXPMTX		B-40	
95-8	323	A	1	V	NV	96-H1508	16	3.0		CCO-696	flake	obsidian	1	0.6	-		103	1/4"	EXPMTX		B-42	
95-8	323	B	1	V	NV	96-H1508	17	3.1		CCO-696	flake	obsidian	1	0.6	-		103	1/4"	EXPMTX		B-42	
95-8	323	C	1	V	NV	96-H1508	18	2.6		CCO-696	flake	obsidian	1	0.5	-		103	1/4"	EXPMTX		B-42	
95-8	326		1	V	NV	96-H1508	19	2.4		CCO-696	flake	obsidian	1	0.1		-	47	1/4"	BURMTX		B-47	
95-8	327		1	XRF	NV	96-H1519	21	3.8		CCO-696	flake	obsidian	1	1.3	-	-	106	1/4"	EXPMTX		B-48	
95-8	335		1	XRF	BH	96-H1519	22	2.5		CCO-696	flake	obsidian	1	0.7	-	-	89	1/4"	EXPMTX		B-53	
95-8	340		2	V	BH?					CCO-696	flake	obsidian	2	0.1		-	112	1/4"	BURMTX		B-59	
95-8	340	A	1	V	NV	96-H1508	20	2.5		CCO-696	flake	obsidian	1	0.1		-	112	1/4"	BURMTX		B-59	
95-8	344		1	V	NV					CCO-696	flake	obsidian	1	0.05		-	115	1/4"	BURMTX		B-62	
95-8	363	A	1	V	NV					CCO-696	flake	obsidian	1	0.6	-	-	114	1/4"	EXPMTX		B-73	
95-8	363	C	1	V	NV	96-H1508	22	2.7		CCO-696	flake	obsidian	1	0.6	-	-	114	1/4"	EXPMTX		B-73	
95-8	366		1	V	NV	96-H1508	23	4.2		CCO-696	flake	obsidian	1	0.1	-	-	88	1/4"	BURMTX		B-75	
95-8	367		1	V	NV	96-H1508	24	2.9		CCO-696	flake	obsidian	1	0.1	-	-	88	1/4"	BURMTX		B-75	
95-8	371		1	V	NV	96-H1519	23	3.6		CCO-696	flake	obsidian	1	0.1			118	1/4"	EXPMTX		B-82	
95-8	385	A	1	V	BH	96-H1508	25	3.5		CCO-696	flake	obsidian	1	0.1		-	82	1/4"	BURMTX		B-107	
95-8	385	B	1	V	NV	96-H1508	26	1.7		CCO-696	flake	obsidian	1	0.1		-	82	1/4"	BURMTX		B-107	
95-8	406		1	V	NV					CCO-696	flake	obsidian	1	0.1			97	1/4"	BURMTX		B-111	
95-8	408		1	V	NV					CCO-696	flake	obsidian	1	2.1		-	118	1/4"	EXPMTX		B-113	
95-8	416	A	1	V	BH?	96-H1508	27	2.4		CCO-696	flake	obsidian	1	0.05	-	-	112	1/4"	BURMTX		B-130	
95-8	416	B	1	V	NV	96-H1508	28	2.8		CCO-696	flake	obsidian	1	0.05	-	-	112	1/4"	BURMTX		B-130	
95-8	426		1	V	NV					CCO-696	flake	obsidian	1	0.1			109	1/4"	BURMTX		B-135	
95-8	429		1	XRF	NV	96-H1519	24	2.4		CCO-696	flake	obsidian	1	0.7		-	114	1/4"	EXPMTX		B-139	
95-8	430	A	1	V	NV	96-H1508	29	2.8		CCO-696	flake	obsidian	1	0.5		-	114	1/4"	EXPMTX		B-139	
95-8	430	B	1	V	NV					CCO-696	flake	obsidian	1	0.5		-	114	1/4"	EXPMTX		B-139	
95-8	430	C	1	V	NV	96-H1508	30	3.3		CCO-696	flake	obsidian	1	0.5		-	114	1/4"	EXPMTX		B-139	
95-8	443		1	V	NV	96-H1508	32	DH		CCO-696	flake	obsidian	1	0.1			49	1/4"	BURMTX		B-145	
95-8	445		1	V	NV					CCO-696	flake	obsidian	1	0.1				1/4"	BURMTX		B-147	
95-8	448		1	V	NV	96-H1508	33	2.3		CCO-696	flake	obsidian	1	0.2	-	-	125	1/4"	BURMTX		B-148	
95-8	460		1	V	NV					CCO-696	flake	obsidian	1	0.1				1/4"	EXPMTX		B-153	
95-8	461		1	V	NV					CCO-696	flake	obsidian	1	0.1				1/4"	EXPMTX		B-153	
95-8	505		1	V	NV					CCO-696	flake	obsidian	1	0.05			103	1/4"	BURMTX		B-6	
95-8	512		1	V	NV					CCO-696	flake	obsidian	1	0.1	-	-	106	1/4"	EXPMTX		B-5A	
95-8	523	A	1	V	BH?					CCO-696	flake	obsidian	1	0.1	-	-	115	1/4"	BURMTX		B-7	
95-8	523	B	1	V	NV	96-H1508	34	3.3		CCO-696	flake	obsidian	1	0.1	-	-	115	1/4"	BURMTX		B-7	
95-8	523	C	1	V	NV	96-H1508	35	3.4		CCO-696	flake	obsidian	1	0.1	-	-	115	1/4"	BURMTX		B-7	
95-8	549	A	1	XRF	NV	96-H1519	25	8.4W		CCO-696	flake	obsidian	1	0.5			70	1/4"	EXPMTX		B-1	
95-8	549	B	1	V	NV					CCO-696	flake	obsidian	1	0.5			70	1/4"	EXPMTX		B-1	
95-8	578		1	V	NV					CCO-696	flake	obsidian	1			-	70	1/4"	EXPMTX		B-4	
95-8	585		5	V	BH?					CCO-696	flake	obsidian	5	0.6		-	91-101	1/8"			F-12	
95-8	585	A	1	XRF	BH	96-H1519	26	5.1		CCO-696	flake	obsidian	1	0.6		-	91-101	1/8"			F-12	
95-8	585	B	1	XRF	NV	96-H1519	27	2.7		CCO-696	flake	obsidian	1	0.6		-	91-101	1/8"			F-12	
95-8	595	A	1	V	NV	96-H1508	36	3.3		CCO-696	flake	obsidian	1	0.3		-	91-101	1/4"			F-12	
95-8	595	B	1	V	NV	96-H1508	37	4.9		CCO-696	flake	obsidian	1	0.3		-	91-101	1/4"			F-12	
95-8	595	C	1	V	NV					CCO-696	flake	obsidian	1	0.3		-	91-101	1/4"			F-12	
95-8	602	A	1	V	NV	96-H1508	38	2.6		CCO-696	flake	obsidian	1	0.2	-	-		1/4"			F-20	

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-8	602	B	1	V	NV	96-H1508	39	3.4		CCO-696	flake	obsidian	1	0.2	-	-		1/4"			F-20	
95-8	603	A	1	V	NV	96-H1508	40	2.6		CCO-696	flake	obsidian	1	0.4	-	-		1/4"			F-20	
95-8	603	B	1	V	NV	96-H1508	41	2.4		CCO-696	flake	obsidian	1	0.4	-	-		1/4"			F-20	
95-8	634		1	XRF	NV	96-H1519	29	3.3		CCO-696	flake	obsidian	1	0.5	-	-	110	1/4"			F-17	
95-8	642		1	V	NV					CCO-696	flake	obsidian	1	0.1	EX1,SC	-	102-102	1/4"			F-6	
95-8	671		1	V	NV					CCO-696	flake	obsidian	1	0.1	S2.5/E22	2MX2M	100-110	1/4"				
95-8	689		2	V	NV					CCO-696	flake	obsidian	2	4	S2.5/E22	2MX2M	120-130	1/4"				
95-8	708		1	V	NV					CCO-696	flake	obsidian	1	0.5	S2.5/E20	2MX2M	040-050	1/4"				
95-8	719		1	V	CD					CCO-696	flake	obsidian	1	0.05	S2.5/E20	2MX2M	070-080	1/4"				
95-8	720	S	1	XRF	NV	95-H1430	19	2.6		CCO-696	flake	obsidian	1	0.4	N0/W5	2MX2M	070-080	1/4"				
95-8	730	N	1	XRF	NV	95-H1430	14	VW		CCO-696	flake	obsidian	1	0.7	N0/W5	2MX2M	080-090	1/4"				
95-8	731		4	V	NV,BH?					CCO-696	flake	obsidian	4	0.05	N0/W5	2MX2M	080-090	1/4"				
95-8	741		2	V	BH,AN					CCO-696	flake	obsidian	2	0.2	N0/W5	2MX2M	100-110	1/4"				
95-8	760		1	V	NV					CCO-696	flake	obsidian	1	0.1	N0/W5	2MX2M	120-130	1/4"				
95-8	770	D	1	XRF	NV	95-H1430	4	2.5		CCO-696	flake	obsidian	1	0.2	N0/W2	2MX2M	070-080	1/4"				
95-8	770	E	1	V	BH?	95-H1430	5	0.8W		CCO-696	flake	obsidian	1	0.2	N0/W2	2MX2M	070-080	1/4"				
95-8	779	G	1	V	BH	95-H1430	7	2.8	4.9	CCO-696	flake	obsidian	1	0.7	N0/W2	2MX2M	080-090	1/4"				
95-8	779	H	1	XRF	NV	95-H1430	8	3.0		CCO-696	flake	obsidian	1	0.7	N0/W2	2MX2M	080-090	1/4"				
95-8	779	I	1	V	NV	95-H1430	9	3.1		CCO-696	flake	obsidian	1	0.7	N0/W2	2MX2M	080-090	1/4"				
95-8	780		5	V	NV,BH?					CCO-696	flake	obsidian	5	0.3	N0/W2	2MX2M	080-090	1/4"				
95-8	789		1	V	NV					CCO-696	flake	obsidian	1	0.05	N0/W2	2MX2M	090-100	1/4"				
95-8	802		1	V	NV					CCO-696	flake	obsidian	1	0.05	N0/W2	2MX2M	100-110	1/4"				
95-8	819		1	V	BH					CCO-696	flake	obsidian	1	0.1	N0/W2	2MX2M	120-130	1/4"				
95-8	830	P	1	V	NV	95-H1430	16	2.5		CCO-696	flake	obsidian	1	0.2	S3/W2	2MX2M	060-070	1/4"				
95-8	830	Q	1	V	NV	95-H1430	17	3.9		CCO-696	flake	obsidian	1	0.2	S3/W2	2MX2M	060-070	1/4"				
95-8	837		2	V	NV					CCO-696	flake	obsidian	2	0.5	S3/W2	2MX2M	070-080	1/4"				
95-8	848		2	V	NV					CCO-696	flake	obsidian	2	0.9	S3/W2	2MX2M	080-090	1/4"				
95-8	854		2	V	NV					CCO-696	flake	obsidian	2	0.3	S5/W2	1.5X1M	050-090	1/4"				
95-8	869		1	V	NV					CCO-696	flake	obsidian	1	0.1	S6/W2	2MX2M	060-070	1/4"				
95-8	884		3	V	NV					CCO-696	flake	obsidian	3	0.7	S6/W2	2MX2M	070-080	1/4"				
95-8	893		1	V	NV					CCO-696	flake	obsidian	1	0.2	S6/W2	2MX2M	080-090	1/4"				
95-8	894		1	V	BH					CCO-696	flake	obsidian	1	0.1	S6/W2	2MX2M	080-090	1/4"				
95-8	911	R	1	XRF	NV	95-H1430	18	3.1		CCO-696	flake	obsidian	1	0.5	S3/W5	2MX2M	051-060	1/4"				
95-8	918		2	V	NV					CCO-696	flake	obsidian	2	0.2	S3/W5	2MX2M	060-070	1/4"				
95-8	929		2	V	BH					CCO-696	flake	obsidian	2	0.3	S3/W5	2MX2M	070-080	1/4"				
95-8	938		6	V	NV, BH					CCO-696	flake	obsidian	6	1.1	S3/W5	2MX2M	080-090	1/4"				
95-8	945		1	V	AN					CCO-696	flake	obsidian	1	0.6	S3/W5	2MX2M	090-100	1/4"				
95-8	950	K	1	XRF	NV	95-H1430	11	2.5		CCO-696	flake	obsidian	1	0.6	S3/W5	2MX2M	090-100	1/4"				
95-8	950	L	1	V	BH	95-H1430	12	2.5		CCO-696	flake	obsidian	1	0.6	S3/W5	2MX2M	090-100	1/4"				
95-8	950	M	1	V	NV	95-H1430	13	2.6		CCO-696	flake	obsidian	1	0.6	S3/W5	2MX2M	090-100	1/4"				
95-8	958		4	V	AN					CCO-696	flake	obsidian	4	3	S3/W5	2MX2M	100-110	1/4"				
95-8	999		1	V	NV					CCO-696	flake	obsidian	1	0.1	S2.5/E28	1MX2M	070-080	1/4"				
95-8	1027		1	V	NV					CCO-696	flake	obsidian	1	0.9	S2.5/E25	2MX2M	110-120	1/4"				
95-8	1037		1	V	NV					CCO-696	flake	obsidian	1	0.2	S2.5/E25	2MX2M	120-130	1/4"				
95-8	1057		1	V	NV					CCO-696	flake	obsidian	1	1.4	S2.5/E25	2MX2M	150-160	1/4"				
95-8	1067		5	V	NV,BH					CCO-696	flake	obsidian	5	1.2	S9/W2	2MX2M	060-070	1/4"				BD
95-8	1075		6	V	NV,BH					CCO-696	flake	obsidian	6	3.9	S9/W2	2MX2M	070-080	1/4"				BD
95-8	1083		1	V	NV					CCO-696	flake	obsidian	1	0.3	S9/W2	2MX2M	080-090	1/4"				BD
95-8	1097		1	V	NV					CCO-696	flake	obsidian	1	0.1	S9/W2	2MX2M	090-100	1/4"				BD
95-8	1107		2	V	NV, BH?					CCO-696	flake	obsidian	2	1	S9/W2	2MX2M	058-070	1/4"				BD
95-8	1117		1	V	NV					CCO-696	flake	obsidian	1	0.8	S9/E9	2MX2M	070-080	1/4"				BD
95-8	1118		1	V	NV					CCO-696	flake	obsidian	1	0.2	S9/E9	2MX2M	070-080	1/4"				BD
95-8	1135		1	V	NV					CCO-696	flake	obsidian	1	0.1	S9/E9	2MX2M	090-100	1/4"				BD
95-8	1139		3	V	NV,BH					CCO-696	flake	obsidian	3	0.7	S9/E9	2MX2M	090-100	1/4"				BD
95-8	1153		1	V	BH					CCO-696	flake	obsidian	1	0.8	S9/E18	2MX2M	060-070	1/4"				BD

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-8	1159		1	V	NV?					CCO-696	flake	obsidian	1	0.3	S9/E18	2MX2M	070-080	1/4"				BD
95-8	1180		1	V	NV					CCO-696	flake	obsidian	1	0.2	S9/E18	2MX2M	100-110	1/4"				BD
95-8	1188		2	V	NV,AN					CCO-696	flake	obsidian	2	2.5	S9/E18	2MX2M	110-120	1/4"				BD
95-8	1200	T-04	1	XRF	NV	95-H1430	25	1.8		CCO-696	flake	obsidian	1	0.6	NW-1	1.3X4M	340-390	-	DEEP			
95-8	1219	T-03	1	XRF	NV	95-H1430	26	1.3		CCO-696	flake	obsidian	1	3.5	SW-1	1.6X4M	340-410	-	DEEP			
95-8	1260		1	XRF	AN	96-H1519	30	1.0		CCO-696	flake	obsidian	1	0.2	E-1	1X4M			DEEP			
95-8	1297	T-02	1	XRF	NV	95-H1430	23	2.4		CCO-696	flake	obsidian	1	0.6	TR7-27-1	-	327-327	-				BD"A"
95-8	1317		1	V	NV					CCO-696	flake	obsidian	1	1.3	TR6-16-1	-						
95-8	1354		1	V	NV					CCO-696	flake	obsidian	1	0.3	EXP-1	-	090-090	-	S31W	22.0M		BD
95-8	1418		1	V	NV					CCO-696	flake	obsidian	1	0.3	BK-1/5	-	098-098	-	S25W	34.4M		D-M3
95-8	1433		1	V	NV					CCO-696	flake	obsidian	1	0.05	M5S	.5MX.5M	000-010	1/4"				
95-8	1435		1	V	NV?					CCO-696	flake	obsidian	1		M5S	.5MX.5M	010-020	1/8"				
95-8	1441		2	V	NV					CCO-696	flake	obsidian	2	0.05	M5S	.5MX.5M	020-030	1/8"				
95-8	1449		2	V	NV					CCO-696	flake	obsidian	2	0.1	M5S	.5MX.5M	030-040	1/8"				
95-8	1456		2	V	NV					CCO-696	flake	obsidian	2	0.05	M5S	.5MX.5M	040-050	1/8"				
95-8	1464		1	V	NV					CCO-696	flake	obsidian	1	0.05	M5S	.5MX.5M	050-060	1/8"				
95-8	1483		1	V	BH					CCO-696	flake	obsidian	1	0.05	M10S	.5MX.5M	000-010	1/8"				
95-8	1492		4	V	NV					CCO-696	flake	obsidian	4	0.1	M10S	.5MX.5M	020-030	1/8"				
95-8	1497		3	V	NV, AN					CCO-696	flake	obsidian	3	0.1	M10S	.5MX.5M	030-040	1/8"				
95-8	1503		4	V	NV					CCO-696	flake	obsidian	4	0.4	M10S	.5MX.5M	040-050	1/8"				
95-8	1512		6	V	NV,BH					CCO-696	flake	obsidian	6	0.1	M10S	.5MX.5M	050-060	1/8"				
95-8	1519		3	V	NV,BH					CCO-696	flake	obsidian	3	0.1	M10S	.5MX.5M	060-070	1/8"				
95-8	1524		1	V	NV					CCO-696	flake	obsidian	1	1.1	M10S	.5MX.5M	070-080	1/8"				
95-8	1530		1	V	NV					CCO-696	flake	obsidian	1	0.1	M15S	.5MX.5M	000-010	1/8"				
95-8	1536		1	V	BH					CCO-696	flake	obsidian	1	0.1	M15S	.5MX.5M	010-020	1/8"				
95-8	1542		4	V	NV					CCO-696	flake	obsidian	4	0.1	M15S	.5MX.5M	020-030	1/8"				
95-8	1547		2	V	NV					CCO-696	flake	obsidian	2	0.1	M15S	.5MX.5M	030-040	1/8"				
95-8	1551		4	V	NV,BH					CCO-696	flake	obsidian	4	0.1	M15S	.5MX.5M	040-050	1/8"				
95-8	1556		1	V	NV					CCO-696	flake	obsidian	1	0.1	M15S	.5MX.5M	050-060	1/8"				
95-8	1563		3	V	NV					CCO-696	flake	obsidian	3	0.6	M15S	.5MX.5M	060-070	1/8"				
95-8	1569		1	V	NV					CCO-696	flake	obsidian	1	0.05	M15S	.5MX.5M	070-080	1/8"				
95-8	1578		5	V	NV,BH					CCO-696	flake	obsidian	5	0.1	M15S	.5MX.5M	080-090	1/8"				
95-8	1592		1	V	NV					CCO-696	flake	obsidian	1	0.1	M20S	.5MX.5M	010-020	1/8"				
95-8	1599		2	V	NV					CCO-696	flake	obsidian	2	0.1	M20S	.5MX.5M	020-030	1/8"				
95-8	1612		3	V	NV,BH					CCO-696	flake	obsidian	3	0.1	M20S	.5MX.5M	040-050	1/8"				
95-8	1620		1	V	NV					CCO-696	flake	obsidian	1	0.05	M20S	.5MX.5M	050-060	1/8"				
95-8	1644		3	V	NV					CCO-696	flake	obsidian	3	0.2	M20S	.5MX.5M	080-090	1/8"				
95-8	1652		2	V	NV					CCO-696	flake	obsidian	2	0.1	M25S	.5MX.5M	000-010	1/8"				
95-8	1665		2	V	NV,BH					CCO-696	flake	obsidian	2	0.1	M25S	.5MX.5M	020-030	1/8"				
95-8	1679		1	V	NV					CCO-696	flake	obsidian	1	0.1	M25S	.5MX.5M	040-050	1/8"				
95-8	1687		6	V	NV,BH					CCO-696	flake	obsidian	6	1.1	M25S	.5MX.5M	050-060	1/8"				
95-8	1697		2	V	NV					CCO-696	flake	obsidian	2	0.05	M25S	.5MX.5M	060-070	1/8"				
95-8	1705		1	V	NV					CCO-696	flake	obsidian	1	0.05	M25S	.5MX.5M	070-080	1/8"				
95-8	1713		3	V	NV					CCO-696	flake	obsidian	3	0.1	M25S	.5MX.5M	080-090	1/8"				
95-8	1719		1	V	NV					CCO-696	flake	obsidian	1	1.3	BK-1/5	A/B	100-100	-				
95-8	1735		1	V	BH					CCO-696	flake	obsidian	1	1.3	BK-2/3	-		-				
95-8	1740		1	V	NV	96-H1544	50	2.4		CCO-696	flake	obsidian	1	0.2	BK-5/7	-	080-080	-				BS
95-8	1767		3	V	NV,BH					CCO-696	flake	obsidian	3	2.2	EX1	-	060-100	-				
95-8	1772		2	V	NV					CCO-696	flake	obsidian	2	1	EX1	-	060-100	-				
95-8	1776	F	1	XRF	NV	95-H1430	6	2.5		CCO-696	flake	obsidian	1	0.5	N0/W2	2MX2M	080-090	1/4"				
95-8	1777	O	1	XRF	NV	95-H1430	15	2.5		CCO-696	flake	obsidian	1	0.6	N0/W5	2MX2M	080-090	1/4"				
95-8	1778	T	1	XRF	NV	95-H1430	20	2.5		CCO-696	flake	obsidian	1	0.6	N0/W5	2MX2M	070-080	1/4"				
95-8	1781		2	V	NV					CCO-696	flake	obsidian	2	0.7	EX1	-	060-100	-				
95-8	1792		1	V	NV					CCO-696	flake	obsidian	1	0.5	EX1	-	-	-				
95-8	1793		1	V	NV					CCO-696	flake	obsidian	1	0.6	EX1	-	-	-				

Acc #	Cat #	Sub	count	src. I.D.	src	hyd. lab	#	band 1	band	site	Desc.	material	count	weight	unit	unit size	depth	mesh	context	area	feature	layer
95-8	1800		4	V	NV,BH					CCO-696	flake	obsidian	4	2.2	EX2	-		-				
95-8	1836		1	V	BH					CCO-696	flake	obsidian	1	1.1	EX2	-		-				
95-8	1868		1	V	BH					CCO-696	flake	obsidian	1	0.5	EX4	-		-				
95-8	1881		2	V	BH					CCO-696	flake	obsidian	2	0.8	EX5	-		-				
95-8	1887		2	V	BH					CCO-696	flake	obsidian	2	1.2	EX5	-		-				
95-8	1895		1	V	BH					CCO-696	flake	obsidian	1	0.7	EXP-5	-						
95-8	1901		1	V	BH					CCO-696	flake	obsidian	1	2.9	EXP-5	-	060-100					
95-8	1920		2	V	NV					CCO-696	flake	obsidian	2	0.5	-	-		-				
95-8	1932		1	V	NV					CCO-696	flake	obsidian	1	1.4	SPOILS	-		-				
95-8	1944		1	V	NV					CCO-696	flake	obsidian	1	0.8	TRENCH	-		-				
95-8	1968		1	V	NV					CCO-696	flake	obsidian	1	0.1	-	-	107	1/4"	BURMTX		B114	
95-8	1969		1	V	NV					CCO-696	flake	obsidian	1	0.7	-	-	122	1/4"	BURMTX		B123	
95-8	1991		1	V	NV					CCO-696	flake	obsidian	1	0.05	-	-	72	1/4"	BURMTX		B143	
95-8	1998		1	V	NV					CCO-696	flake	obsidian	1	0.3	-	-	133	1/4"	EXPMTX		B2	
95-8	2016		1	V	AN					CCO-696	flake	obsidian	1	0.2	TR7-27-1	-	327-327	1/4"	BD			
95-8	2018		1	V	NV					CCO-696	flake	obsidian	1	0.3			114	1/4"	BURMTX		B40	
95-8	2022		1	V	BH					CCO-696	flake	obsidian	1	0.5			106	1/4"	BURMTX		B48	
95-8	2023		1	V	NV					CCO-696	flake	obsidian	1	0.05			98	1/4"	BURMTX		B49	
95-8	2024		1	V	NV					CCO-696	flake	obsidian	1	0.05			89	1/4"	BURMTX		B53	
95-8	2025		3	V	NV,BL					CCO-696	flake	obsidian	3	1.9			119	1/4"	BURMTX		B54	
95-8	2036		1	V	BH					CCO-696	flake	obsidian	1	0.4			118	1/4"	BURMTX		B82	
95-8	2038		1	V	BH					CCO-696	flake	obsidian	1	0.9			101	1/4"	BURMTX		B89	
95-8	2040		1	V	BH					CCO-696	flake	obsidian	1	0.2			116	1/4"	BURMTX		B91	
95-8	2045		1	V	BH					CCO-696	flake	obsidian	1	0.05			120	1/4"	BURMTX		B117	
95-8	2082		1	V	NV					CCO-696	flake	obsidian	1	1.6				1/4"	BURMTX		B159	
95-8	3004	A	1	V	NV	96-H1544	60	2.0		CCO-696	flake	obsidian	1		W-1			1/8"	FLOT 125			
95-8	3004	B	1	V	NV	96-H1544	61	2.4		CCO-696	flake	obsidian	1		W-1			1/8"	FLOT 125			
95-8	3005		1	V	NV	96-H1544	62	2		CCO-696	flake	obsidian	1					1/8"	FLOT 97			
95-8	3006		1	V	NV	96-H1544	63	2.2		CCO-696	flake	obsidian	1		W-1		390-400	1/8"	FLOT 128			
95-8	3007		1	V	NV	96-H1544	64	2.3		CCO-696	flake	obsidian	1		NW-1			1/16"	FLOT 98			
95-8	3008		1	V	NV	96-H1544	65	NVB		CCO-696	flake	obsidian	1		NW-1			1/8"	FLOT 98			
95-8	3009		1	V	NV	96-H1544	66	2		CCO-696	flake	obsidian	1		W-1		400-410	1/4"	FLOT 129			
95-8	3010		1	V	NV	95-H1553	1	2.5		CCO-696	flake	obsidian	1		NW-1		390-415	1/16"				

Small Modified Flakes 1 of 1

Acc.	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Form	Material	Source	Source	Hyd. Lab	#	Band 1	Site	Unit	Unit Sz.	Depth	Mesh	Context	Area	Feature	Layer	Remarks
95-12	31		48.9	33.7	9	7.8	Modified Flk.	Obsidian	V	NV				OFF SITE	-								Core spall, cortex
95-12	33		43.9	21.1	11.1	9.7	Modified Flk.	Obsidian	V	NV				OFF SITE	-	-		-					Core spall, cortex
95-2	103	A	18	15.5	4.1	0.8	Modified Flk.	Obsidian	V	NV				CCO-458W	N120/W108	1MX2M	020-030	1/4"					Bipolar, Edge Modified
95-2	103	B	21.9	9.9	3.1	0.8	Modified Flk.	Obsidian	V	BH				CCO-458W	N120/W108	1MX2M	020-030	1/4"					Edge Modified
95-2	103	C	23.5	8.8	4.9	0.8	Modified Flk.	Obsidian	V	NV				CCO-458W	N120/W108	1MX2M	020-030	1/4"					Core spall, edge modified
95-2	213		22.7	25.2	6.9	3.3	Modified Flk.	Chert						CCO-458W	N124/W107	1MX2M	000-020	1/4"					Edge Modified
95-2	214		24.2	13.9	4.4	1	Modified Flk.	Obsidian	V	NV				CCO-458W	N124/W107	1MX2M	000-020	1/4"					Edge Modified
95-2	218		14.9	13.5	3.5	0.5	Modified Flk.	Obsidian	V	NV				CCO-458W	N124/W107	1MX2M	000-020	1/4"					Cortex, edge modofied
95-2	220		14	9.7	2.8	0.4	Modified Flk.	Obsidian	V	BH				CCO-458W	N124/W107	1MX2M	000-020	1/4"					Edge Modified
95-2	318		23.5	12.1	3.8	0.9	Modified Flk.	Obsidian	V	NV				CCO-458W	N120/W105	1MX2M	000-010	1/4"					Edge Modified
95-2	319		18.8	18	5.1	1.7	Modified Flk.	Obsidian	V	NV				CCO-458W	N120/W105	1MX2M	000-010	1/4"					Edge Modified
95-2	324		23.1	12.2	4	1	Modified Flk.	Obsidian	V	NV				CCO-458W	N120/W105	1MX2M	000-010	1/4"					Edge Modified
95-2	349		25.7	14.9	5.6	1.6	Modified Flk.	Obsidian	V	NV				CCO-458W	N120/W105	1MX2M	010-020	1/4"					Core spall
95-2	500		23.4	14.1	4.9	1.6	Modified Flk.	Obsidian	V	NV				CCO-458W	N120/W107	1MX2M	000-010	1/4"					Core spall, cortex
95-2	516		18.5	12.3	5.4	1.1	Modified Flk.	Obsidian	V	NV				CCO-458W	N120/W107	1MX2M	010-020	1/4"					Edge modified
95-2	531		15.9	15.5	7.2	1	Modified Flk.	Obsidian	V	NV				CCO-458W	N120/W107	1MX2M	020-030	1/4"					Edge modified
95-2	551		25.9	7.3	2.1	0.4	Modified Flk.	Obsidian	V	NV				CCO-458W	N120/W107	1MX2M	030-040	1/4"					Edge modified
95-2	636		13.2	10.1	4.8	0.8	Modified Flk.	Obsidian	V	NV				CCO-458W	N122/W110	1MX2M	000-010	1/4"					Edge modified, cortex
95-2	840		27.8	18.4	8.4	3.9	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W106	1MX2M	010-020	1/4"					Core spall, cortex
95-2	849		18.5	16.9	8	1.7	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W106	1MX2M	010-020	1/4"					Core spall, cortex
95-2	869		21.6	7.9	4.3	0.5	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W106	1MX2M	020-030	1/4"					Edge modified
95-2	870		28.6	15.4	7.8	2.2	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W106	1MX2M	020-030	1/4"					Core spall, cortex
95-2	893		19.1	18.6	4.1	1	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W106	1MX2M	030-040	1/4"					Edge Modified
95-2	1061		26.3	15.2	5.5	1.6	Modified Flk.	Obsidian	V	NV				CCO-458W	N124/W105	1MX2M	030-040	1/4"					Edge modified, cortex
95-2	1252		20.3	13.4	13.8	0.7	Modified Flk.	Obsidian	V	NV				CCO-458W	N124/W109	1MX2M	010-020	1/4"					Edge modified, cortex
95-2	1253		18	7.7	4.9	0.5	Modified Flk.	Obsidian	V	NV				CCO-458W	N124/W109	1MX2M	010-020	1/4"					Bipolar, Used Flake
95-2	1254		24.7	24.7	7.8	5.3	Modified Flk.	Obsidian	V	NV				CCO-458W	N124/W109	1MX2M	010-020	1/4"					Heat fractured
95-2	1298		19.7	12.3	13.7	0.7	Modified Flk.	Obsidian	V	NV				CCO-458W	N124/W109	1MX2M	030-040	1/4"					Cortex
95-2	1299		14.9	9.4	3.6	0.5	Modified Flk.	Obsidian	V	NV				CCO-458W	N124/W109	1MX2M	030-040	1/4"					Edge modified
95-2	1319		22.4	11	4.3	0.9	Modified Flk.	Obsidian	V	NV				CCO-458W	N124/W109	1MX2M	040-050	1/4"					Edge modified, frag.
95-2	1392		15.8	14	5.2	1.1	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W103	1MX2M	020-030	1/4"					Edge modified
95-2	1511		25.6	19.1	5.1	2.6	Modified Flk.	Obsidian	V	NV				CCO-458W	N122/W104	1MX2M	020-030	1/4"					Edge modified
95-2	1560		17.7	11	3.9	0.3	Modified Flk.	Obsidian	V	NV				CCO-458W	N125/W105	1MX2M	000-010	1/4"					Edge modified
95-2	1608		15.8	11.5	6.3	0.9	Modified Flk.	Obsidian	V	NV				CCO-458W	N125/W105	1MX2M	030-040	1/4"					Edge modified, cortex
95-2	1665		18.7	16.1	5.3	1.8	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W108	1MX2M	010-020	1/4"					Edge modified, cortex
95-2	1666		21.5	6.7	4.2	0.5	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W108	1MX2M	010-020	1/4"					Core spall, cortex
95-2	1669		17.5	9.2	3.6	0.6	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W108	1MX2M	010-020	1/4"					Edge modified
95-2	1704		25.2	5.4	3.7	0.4	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W108	1MX2M	030-040	1/4"					Core spall, cortex
95-2	1812		21.2	9.8	4.7	0.4	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W108	1MX2M	080-090	1/4"					Core spall, cortex
95-2	1896		19.2	11	4.1	0.8	Modified Flk.	Obsidian	V	NV				CCO-458W	N122/W109	1MX2M	000-000	1/4"			Feat. 9		Edge modified
95-2	1905		20.5	9.7	7.1	1.2	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W104	1MX2M	000-010	1/4"					Core spall, cortex
95-2	1998		20.9	7	5.8	0.6	Modified Flk.	Obsidian	V	NV				CCO-458W	N100/W110	1MX1M	000-020	1/4"					Core spall
95-2	2108		29.9	14.6	7.7	2.5	Modified Flk.	Obsidian	V	NV				CCO-458W	N140/W70	1MX1M	000-020	1/4"					Edge modified
95-2	2212		17.1	8.1	6.4	0.7	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W110	1MX2M	010-020	1/4"					Core spall
95-2	2235		22.5	20	9.5	3.5	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W110	1MX2M	020-030	1/4"					Core spall, cortex
95-2	2327		23.9	16.6	6.8	2.4	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W110	1MX2M	080-090	1/4"					Core spall, cortex
95-2	2536		37.8	16.3	6.9	3.6	Modified Flk.	Siltstone						CCO-458W	N124/W109	1MX2M	040-050	1/4"					Edge modified
95-2	2553		29.3	8.7	5.3	1.2	Modified Flk.	Obsidian	V	NV				CCO-458W	N126/W106	1MX2M	010-020	1/4"					Core spall
95-3	130	W	28.1	22.1	9	5.8	Modified Flk.	Obsidian	V	NV				CACCO-459	S2/E5	1MX2M	000-010	1/4"					Cortex
95-8	363	B	6.1	8.4	4.8	0.6	Modified Flk.	Obsidian	V	NV	96-H1508	21	3.0	CCO-696W	-	-	114	1/4"	Expmtx		Bur 73		Edge modified
95-8	586		18.9	7.3	7.3	0.8	Modified Flk.	Chert						CCO-696W	-	-		1/8"			Feat. 12		Edge modified, frag.
95-8	1136		22.2	10.7	10.1	2.1	Modified Flk.	Chert						CCO-696W	S9/E9	2MX2M	090-100	1/4"				BD	Edge modified
95-8	1137		27.2	16	8.7	3.7	Modified Flk.	Chert						CCO-696W	S9/E9	2MX2M	090-100	1/4"				BD	Edge modified
95-8	1353		19.2	13.5	5.2	1.1	Modified Flk.	Obsidian	V	NV				CCO-696W	EXP-1	-	103-103	-	S24W	21.2M			Edge modified
95-8	1930		38.3	29.9	10.1	8.1	Modified Flk.	Chert						CCO-696W	SPOILS	-		-					Edge modified

Large Modified Flakes 1 of 1

Acc.	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Form	Material	Source	Source	Hyd. Lab	#	Band 1	Site	Unit	Unit Sz.	Depth	Mesh	Context	Area	Feature	Layer	Remarks
95-8	2005		57.5	49	22.8	68.6	Modified Flk.	Basalt						CCO-696S	TR12-1-2	-	080-100	-					Core spall, cortex
95-2	1		38.9	30	13.1	13.4	Modified Flk.	Chert						CCO-458W	N120/W106	1MX2M	000-010	1/4"					Core spall
95-8	859		47	38.3	23	32.5	Modified Flk.	Chert						CCO-696S	S5/W2	1.5X1M	050-090	1/4"					Core spall
95-2	2071		65.4	64.2	31.2	75.4	Modified Flk.	Obsidian	V	NV				CCO-458W	N130/W100	1MX1M	000-020	1/4"					Flake Blank, Cortex
95-8	395		86.7	71.9	32.9	216	Modified Flk.	Quartzite						CCO-696S					Expmtx		Bur 2		Core spall, cortex
95-8	1234		50.9	46.5	19.3	46.9	Modified Flk.	Quartzite						CCO-696S	NE-1	1.3X4M	-	-	Deep				Core spall
95-2	2294		57.8	33.7	15.8	31.2	Modified Flk.	Siltstone						CCO-458W	N126/W110	1MX2M	030-040	1/4"					Core spall
95-7	92		51.8	49	22.4	63.6	Modified Flk.	Siltstone						CCO-637	S27/W3	1MX2M	080-090	1/4"					Core spall
95-7	390		58.5	45.3	21.8	60	Modified Flk.	Siltstone						CCO-637	TR4-27-1	-		-	Spoils				Core spall
95-8	2057		67.5	52.6	20	64.4	Modified Flk.	Siltstone						CCO-696N	2ND SOIL	-	-	-	Deep				Core spall
95-8	957		44.4	32.9	19.1	20	Modified Flk.	Chert						CCO-696S	S3/W5	2MX2M	100-110	1/4"					Core spall
95-8	1116		57.5	33.4	18.5		Modified Flk.	Hornfels						CCO-696S	S9/E9	2MX2M	070-080	1/4"				BD	Core spall
95-8	1925		33.7	28.9	14.5	13.1	Modified Flk.	Dacite						CCO-696S	SPOILS	-		-					Core spall

Small Projectile Points 1 of 3

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Nk Wdth	Stm Wdth	PSA	DSA	# Ser	Ser. Sze	Haft L.	Portion	Type	Arr. Cm.	Source	Hyd. Lab	#	Band 1	Site	Unit	Depth	Datum	Feature
95-11	23	K	27.3	11.6	3.9	1.0	9.1	10.6	160	200	2	1.5	7.8	Complete	Side Ntch	5	NV	94-H1388	1	1.3	CCO-468	N0/W2	020-030		
95-11	26	N	17.4	11.9	4.2	0.7	8.5	11.5	160	220	2	1.2	6.2	Complete	Side Ntch	5	NV	94-H1388	4	1.2	CCO-468	N0/W30	000-020		
95-11	39	L	22.8	12.9	4.2	1.1	8.7	9.3	100	190	4	1.9	6.7	Base	Stemmed	5	NV	94-H1388	2	1.1	CCO-468	S10/W40	000-020		
95-11	41	M	22.5	11.3	3.7	0.8					2	1.8		Tip			NV	94-H1388	3	2.3	CCO-468	S10/W100	000-020		
95-2	16		18	14.4	2.7	0.8					0			C. Comp	Preform	5	NV				CCO-458W	N120/W106	010-020		
95-2	17		18.4	10.4	3.5	0.5	5.9	7.6	150	190	2	1.6	3.5	C. Comp	Side Ntch	4	BH				CCO-458W	N120/W106	010-020		
95-2	18		14.1	16.5	3.4	0.8	9.9	13.5	160	185	1	2.2	3.9	Base	Side Ntch	5	NV				CCO-458W	N120/W106	010-020		
95-2	19		16.2	10.6	3.2	0.5					2	1.7		Margin		4	NV				CCO-458W	N120/W106	010-020		
95-2	37		24.7	11.8	4.1	1					1	0.9		Tip		4	NV				CCO-458W	N120/W106	020-030		
95-2	53		12.2	14.8	2.7	0.4	6.2	14.8					9	Base	Panoche	5	CT				CCO-458W	N120/W108	000-010		
95-2	78		13.6	13.7	3.3	0.6	6.3	13.7					4.3	Base	DSN	5	CT				CCO-458W	N120/W108	010-020		
95-2	79		20.1	11.4	2.9	0.5	6.3	11.4					3.6	Complete	DSN	5	CT				CCO-458W	N120/W108	010-020		
95-2	80		15.1	11.8	3.9	0.6					1	0.9		Midsec.		4	NV				CCO-458W	N120/W108	010-020		
95-2	89		6.7	12.4	3.4	0.4	7.1	12.4					5.5	Base	Panoche	5	CT				CCO-458W	N120/W108	010-020		
95-2	99		8.1	11	2.8	0.3					1	1		Margin		4	NV				CCO-458W	N120/W108	010-020		
95-2	101		27.7	13.3	5.5	1.5	9.4	13.3					4.4	C. Comp	DSN	5	NV	95-H1544	2	2.0	CCO-458W	N120/W108	020-030		
95-2	121		14.1	2.4	3.6	0.7	10.3	12.5	130	210	1	1.1	7.3	Base	Side Ntch	5	NV				CCO-458W	N120/W108	030-040		
95-2	134		21.1	10.1	3.7	0.7			160	210	2	0.5		Margin	Side Ntch	4	NV				CCO-458W	N122/W106	000-010		
95-2	136		6.7	10.9	3.5	0.2			150	170	1	0.7	4.2	Base	Side Ntch	4	NV				CCO-458W	N122/W106	000-010		
95-2	175		15.1	16.1	2.8	0.8								Base	Preform	5	NV				CCO-458W	N122/W106	020-030		
95-2	176		3.1	10.3	3.8	0.6	9	10.2	150	230	1	0.6	7.8	Base	Side Ntch	5	NV				CCO-458W	N122/W106	020-030		
95-2	177		20.5	12.3	4.2	0.9	8	12.1	180	220	1	1.2	10.1	C. Comp	Side Ntch	5	NV	95-H1544	3	1.9	CCO-458W	N122/W106	020-030		
95-2	199		6.9	11.3	2.6	0.2	7.8	8.4	140	190			2.8	Base	Side Ntch	5	NV				CCO-458W	N122/W106	030-040		
95-2	209		25.5	13	3.9	1.3	11.2	11.7	120	210	1	1.2	6.5	C. Comp	Side Ntch	4	NV				CCO-458W	N124/W107	000-020		
95-2	225		7.1	9.2	2.8	0.1	5.3	9.2	120					Base	Corner Ntch	5	NV				CCO-458W	N124/W107	000-020		
95-2	245		13.6	11.3	2.7	0.3	6.9	6.9	94	175	1	0.4	2.4	C. Comp.	Stemmed	5	AN?				CCO-458W	N124/W107	020-030		
95-2	260		14.1	12.3	2.3	0.3					1	2		Margin		5	NV				CCO-458W	N124/W107	030-040		
95-2	371		25.9	12.1	4.1	1.2	7.4	7.6	94	190	6	1.4	5.1	Base	Stemmed	4	NV				CCO-458W	N120/W105	020-030		
95-2	415		12.5	11.7	3.2	0.6	9.2	11.2	160	190			4.4	Base	Side Ntch	5	NV				CCO-458W	N122/W108	010-020		
95-2	418		24.4	15.8	2.3	0.6					2	3.1		Tip		4	NV				CCO-458W	N122/W108	010-020		
95-2	419		20.3	13.8	2.7	0.6	9.5	8	85	200	3	1.4	5.7	Complete	Stemmed	1	NV				CCO-458W	N122/W108	010-020		
95-2	421		7.7	11.1	3.2	0.2					1	0.6		Margin		5	NV				CCO-458W	N122/W108	010-020		
95-2	441		15.3	11.2	3.5	0.5					1	1.3		Midsec.		4	NV				CCO-458W	N122/W108	020-030		
95-2	442		7.1	14.8	3.4	0.4	10.2	11.4	110	180			3.5	Base	Side Ntch	5	NV				CCO-458W	N122/W108	020-030		
95-2	443		10	11.9	3.4	0.4	9.9	11.1	130	220			3.9	Base	Side Ntch	4	NV				CCO-458W	N122/W108	020-030		
95-2	469		13.9	12.9	2.8	0.5	10.6	12.3	160	210	1	1.3	4.6	Base	Side Ntch	5	NV				CCO-458W	N122/W108	040-050		
95-2	484		7.7	5	3.8	0.3	9.4	15	120	220			6.8	Base	Side Ntch	5	NV				CCO-458W	N124/W105	000-010		
95-2	485		5.7	12.8	3.4	0.7					1	1.2		Midsec.		5	NV?				CCO-458W	N124/W105	000-010		
95-2	487		6.5	12.8	2.7	0.2	10.6	12.9	150				4.4	Base	Side Ntch	5	NV				CCO-458W	N124/W105	000-010		
95-2	513		20.9	13.9	5.1	1.1	5.1	13.9					7.6	Complete	Panoche	5	CT				CCO-458W	N120/W107	010-020		
95-2	514		9.3	15.7	3.6	0.5	8.9	8.4	70	190	1	1.8	3.8	Base	Stemmed	5	NV				CCO-458W	N120/W107	010-020		
95-2	515		8.4	9.7	2.4	0.2	6.3	9.7	140					Base	Corner Ntch	5	NV				CCO-458W	N120/W107	010-020		
95-2	529		15.9	13.8	4.5	0.9	11.1	12.8	160	190	1	0.9	5.3	Base	Side Ntch	5	BH				CCO-458W	N120/W107	020-030		
95-2	575		21	10.9	4.3	0.8	8.3	10.8	170	200	1	1.4	7.9	Base	Side Ntch	5	NV				CCO-458W	N122/W105	010-020		
95-2	577		16.2	12.5	3.3	0.2			120	200				Base	Side Ntch	5	NV				CCO-458W	N122/W105	010-020		
95-2	579		6.2	12	2.6	0.2			160					Base	Side Ntch	4	NV				CCO-458W	N122/W105	010-020		
95-2	603		28.4	13.2	5.2	1.6	10.7	11.3	100	190	3	1.7	7.8	Complete	Stemmed	5	BH	95-H1544	4	2.9	CCO-458W	N122/W105	020-030		
95-2	654		16.6	11.7	4	0.7					1	0.8		Tip		4	NV				CCO-458W	N122/W110	010-020		
95-2	655		6.4	13.6	2.9	0.3	10.1	13.5	170				5.2	Base	Side Ntch	5	NV				CCO-458W	N122/W110	010-020		
95-2	668		10.4	16.4	4.7	0.6	6.4	16.4					8.1	Base	Panoche	5	PW				CCO-458W	N122/W110	020-030		
95-2	685		25.7	14.9	5.4	1.6	9.9	8.4	85	190	3	0.9	4.4	Complete	Stemmed	3	NV				CCO-458W	N122/W110	030-040		
95-2	686		15.7	11.5	3.2	0.6	10.7	11.8	150	230	1	0.8	7.1	Base	Side Ntch	5	NV				CCO-458W	N122/W110	030-040		
95-2	728		10.2	9.6	2.6	0.3					1	2.3		Margin		5	NV				CCO-458W	N122/W110	050-060		
95-2	756		23.3	10.5	5.4	1.2	8.5	10.3	140	220	0		7.2	Complete	Side Ntch	4	NV				CCO-458W	N122/W107	000-010		
95-2	767		25.8	10.7	3.8	0.8	8.6	8.5	90	210	2	1.8	7.2	Complete	Stemmed	4	BH	95-H1544	5	1.8	CCO-458W	N122/W107	000-010		
95-2	802		19.8	12.9	5	1	7.4	8.8	120	180	4	2.2	4.5	Base	Side Ntch	5	NV				CCO-458W	N122/W107	020-030		

Small Projectile Points 2 of 3

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Nk Wdth	Stm Wdth	PSA	DSA	# Ser	Ser. Sze	Haft L.	Portion	Type	Arr. Cm.	Source	Hyd. Lab	#	Band 1	Site	Unit	Depth	Datum	Feature
95-2	826		20.9	11.6	3.4	0.7	10.3	11.4	160	200	1	0.6	7.3	Complete	Side Ntch	4	NV	95-H1544	6	1.7	CCO-458W	N126/W106	000-010		
95-2	839		23.3	13.5	4	1.2	8.1	7.1	80	220	5	1.9	4.8	Base	Stemmed	4	BL	95-H1544	7	VW	CCO-458W	N126/W106	010-020		
95-2	841		12.4	10.3	1.9	0.2					1	2		Tip		5	BH				CCO-458W	N126/W106	010-020		
95-2	867		13.6	10	3.5	0.4					1	1.3		Tip		4	NV				CCO-458W	N126/W106	020-030		
95-2	891		19.3	11.9	4.4	1								C. Comp	Preform	4	NV				CCO-458W	N126/W106	030-040		
95-2	892		10.5	13	3.6	0.5	9.4	7.9	80	220				Base	Stemmed	4	NV				CCO-458W	N126/W106	030-040		
95-2	918		14.7	12.7	4	0.8					1	1.9		Midsec.		5	NV				CCO-458W	N126/W106	040-050		
95-2	919		19.2	10.2	3.7	0.7					2	0.9		Tip		4	NV				CCO-458W	N126/W106	040-050		
95-2	942		27.1	15.6	4.6	1.6								C. Comp	DSN	4	NV	95-H1544	8	1.7	CCO-458W	N126/W106	040-050		
95-2	961		18.7	10.2	3.9	0.9					1	1.1		Midsec.		5	NV				CCO-458W	N120/W105	030-040		
95-2	979		10.7	13.9	2.5	0.4	5.3	8.6	110	160	1		5.4	Base	Corner Ntch	5	NV				CCO-458W	N122/W104	000-010		
95-2	980		17.5	9.2	3.2	0.6					1	1		Midsec.		5	NV				CCO-458W	N122/W104	000-010		
95-2	996		21.9	10	3.4	0.8					2	0.6		Midsec.		5	NV				CCO-458W	N122/W104	010-020		
95-2	997		14.5	10.6	3.5	0.5					1	0.9		Midsec.		5	NV				CCO-458W	N122/W104	010-020		
95-2	1006		17.4	12.9	3.4	0.7					0		8.5	Complete	Preform	5	NV				CCO-458W	N124/W105	010-020		
95-2	1031		11.1	11	4.3	0.5	7.4	9						Midsec.		5	NV				CCO-458W	N124/W105	020-030		
95-2	1055		11.6	13.1	3.3	0.4	7.8	4.4	150	180	1	1.9	4.5	Base	Side Ntch	5	NV				CCO-458W	N124/W105	030-040		
95-2	1056		7.6	1.3	4	0.3	9	10.4	150	180			3.7	Base	Side Ntch	5	AN				CCO-458W	N124/W105	030-040		
95-2	1057		21.6	15.7	4.3	1.3	10.3	13.4	150	170	2	2.6	4.9	Base	Side Ntch	4	NV	95-H1544	9	DH	CCO-458W	N124/W105	030-040		
95-2	1058		20.9	14.3	3.1	0.6					1	3.1		Tip		5	NV				CCO-458W	N124/W105	030-040		
95-2	1077		16.7	12.5	4.8	0.8					3	1.3		Midsec.		4	AN				CCO-458W	N124/W105	040-050		
95-2	1078		12.1	13.7	4	0.6	11.3	13.7	150	220			6.6	Base	Side Ntch	5	NV				CCO-458W	N124/W105	040-050		
95-2	1098		16.9	10.2	3.5	0.6	9.3	9.8	120	210	2	1.2	4.5	Complete	Side Ntch	4	NV				CCO-458W	N124/W105	050-060		
95-2	1270		17.9	11.1	2.3	0.3					2	1.2		Tip		5	NV				CCO-458W	N124/W109	020-030		
95-2	1271		18.6	9.9	3.6	0.5	6.5	10	160	210	1	0.9		C. Comp	Side Ntch	5	NV	95-H1544	10	1.0	CCO-458W	N124/W109	020-030		
95-2	1293		10.2	11.5	3.1	0.3	8.1	11.5	140	200			4.9	Base	Side Ntch	5	NV				CCO-458W	N124/W109	030-040		
95-2	1317		21.9	13.5	5	1.8		3.4	80		0		8.5	Base	Stemmed	4	NV				CCO-458W	N124/W109	040-050		
95-2	1344		27.9	14.9	5	1.4	5.1	14.9					7.4	Complete	Panoche	5	CT				CCO-458W	N124/W109	000-010		
95-2	1346		15.1	11.6	3.6	0.6					2	1.2		Midsec.		5	AN				CCO-458W	N124/W109	010-020		
95-2	1347		13.6	11.4	3.5	0.6					1	1.2		Midsec.		5	NV				CCO-458W	N126/W103	000-010		
95-2	1367		5.7	12.2	3.1	0.2			170				4.8	Base	Side Ntch	5	NV				CCO-458W	N126/W103	010-020		
95-2	1388		15.9	10.8	3.2	0.4	7.1	10	140	180	1	1.9	4.9	Complete	Side Ntch	4	NV				CCO-458W	N126/W103	020-030		
95-2	1434		17.2	11.4	3.1	0.6	7.3	9.7	170	190	3	2	4.4	Base	Side Ntch	5	NV				CCO-458W	N126/W103	040-050		
95-2	1510		21.2	13.8	3.5	1.1	10.1	9.5	90	180	4	1.3	8.5	Base	Stemmed	4	NV	95-H1544	11	3.0	CCO-458W	N122/W104	020-030		
95-2	1553		15.2	12.2	3.2	0.4					1	1.3		Tip		4	NV				CCO-458W	N125/W105	000-010		
95-2	1554		16.6	12.4	3.6	0.6	10.9	12	160	190	1	1	6.1	Base	Side Ntch	5	NV				CCO-458W	N125/W105	000-010		
95-2	1577		15.2	2	4.8	0.6					2	1.6		Margin		4	NV				CCO-458W	N125/W105	010-020		
95-2	1606		23.7	12.4	3.5	0.7	5.1	12.4					5.1	Complete	Panoche	5	CT				CCO-458W	N125/W105	030-040		
95-2	1639		15.2	9.6	4.7	0.5					5	1.2		Margin		4	NV				CCO-458W	N126/W108	000-010		
95-2	1681		23.9	12.5	4.9	1.3					4	0.8		Midsec.		5	NV				CCO-458W	N126/W108	020-030		
95-2	1702		14.2	14.7	4.1	0.8	8.9	11.2	140	150	2	1.4	4.5	Base	Side Ntch	5	NV				CCO-458W	N126/W108	030-040		
95-2	1770		18.7	11.1	4	0.8	7.4	7.8	90	200	0		6.3	Complete	Stemmed	5	NV	95-H1544	12	DH	CCO-458W	N126/W108	050-060		Feat. 2
95-2	1772		7.9	12.4	3.8	0.4					1	2.4		Margin		5	NV				CCO-458W	N126/W108	060-070		
95-2	1773		11.6	15.3	4	0.7	11.8	14.3	170	200			5.5	Base	Side Ntch	5	NV				CCO-458W	N126/W108	060-070		
95-2	1774		7.2	6.8	3.1	0.1					1	0.8		Margin		5	NV				CCO-458W	N126/W108	060-070		
95-2	1796		22.5	11.1	3.7	0.7	5.4	10.3					6.4	C. Comp	Panoche	5	CT				CCO-458W	N126/W108	070-080		
95-2	1811		10.6	14.2	4	0.5	9.3	8.1	80	190	2	1.8	6.1	Base	Stemmed	5	AN?				CCO-458W	N126/W108	080-090		
95-2	1844	SA 1	13.6	12.7	3.6	0.6	8.4	12.4	160	180	1	2.5	4.7	Base	Side Ntch	5	NV	94-H1386	1	1.8	CCO-458W	N0/W100	-		
95-2	1853	SA 10A	10.3	9.7	3.2	0.3								Base	Preform	5	NV	94-H1386	10	1.3	CCO-458W	SURFACE	-		
95-2	1892		21.6	15.5	4.2	1.5	12.1	15.5	160	200	2	2.6	12.7	Base	Side Ntch	4	NV				CCO-458W	N122/W110	000-000		Feat. 9
95-2	1893		23.8	11.8	4	0.9	10	11.3	130	230	2	1.2	4.6	C. Comp	Side Ntch	4	NV				CCO-458W	N122/W110	000-000		Feat. 9
95-2	1894		22.4	11.4	3.9	1					1	0.9		Midsec.		5	NV				CCO-458W	SURFACE			Feat. 9
95-2	1901		25.1	12	5.3	1.4					1	1.7		Margin		5	NV				CCO-458W	N126/W104	000-010		
95-2	1902		10.1	13.7	3.3	0.4	6.7	1.1	150	160			4.3	Base	Corner Ntch	4	IND.				CCO-458W	N126/W104	000-010		
95-2	1904		11.3	11.7	4	0.5					1	1.4		Midsec.		5	NV				CCO-458W	N126/W104	000-010		
95-2	1921		9.5	12.5	2.8	0.3	6.8	11.3	160	180			5.2	Base	Side Ntch	5	NV				CCO-458W	N126/W104	010-020		

Small Projectile Points 3 of 3

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Nk Wdth	Stm Wdth	PSA	DSA	# Ser	Ser. Sze	Haft L.	Portion	Type	Arr. Cm.	Source	Hyd. Lab	#	Band 1	Site	Unit	Depth	Datum	Feature
95-2	1922		15.8	14.1	4.5	1					2	2.2		Midsec.		5	NV				CCO-458W	N126/W104	010-020		
95-2	1939		20.2	11.1	3.7	0.7	9.6	10.3	140	200	1	1.4	5.2	C. Comp	Side Ntch	5	NV				CCO-458W	N126/W104	020-030		
95-2	2057		18.7	11.2	3.2	0.6	9.5	10.6	180	200	1	1.1	4.4	C. Comp	Side Ntch	4	NV				CCO-458W	N130/W100	000-020		
95-2	2058		27.6	13	4.2	1.3	7.7	10	150	160	4	1.7	5.5	C. Comp	Side Ntch	5	NV				CCO-458W	N130/W100	000-020		
95-2	2060		6.1	13.9	2.2	0.2	10.6	13.9	150				5.7	Base	Side Ntch	4	NV				CCO-458W	N130/W100	000-020		
95-2	2082		25.9	10.2	3.9	0.9					4	1.5		Midsec.		5	NV				CCO-458W	N120/W120	000-020		
95-2	2083		5.9	9.5	2.7	0.3					2	1.9		Tip		5	NV				CCO-458W	N120/W120	000-020		
95-2	2084		12.3	13.4	4.6	0.6	7	12.2	160	210	1	1.9	4.9	Base	Side Ntch	4	NV				CCO-458W	N120/W120	000-020		
95-2	2159		9.5	13.3	2.8	0.4	10.3	11.7	170	200			3.2	Base	Side Ntch	5	NV				CCO-458W	N170/W100	000-020		
95-2	2207		12.7	13.2	3.7	0.6					1	0.9		Midsec.		5	NV				CCO-458W	N126/W110	010-020		
95-2	2231		12.4	9.9	2.3	0.3	8.1	9.8	150	200	1	0.9	8.2	Base	Side Ntch	5	NV				CCO-458W	N126/W110	020-030		
95-2	2232		13.1	8	2.3	0.2					1	0.6		Tip		5	NV				CCO-458W	N126/W110	020-030		
95-2	2233		19.9	9.6	3.4	0.5	7.4	9.7	140	210	1	1.5	5.9	Complete	Side Ntch	5	NV				CCO-458W	N126/W110	020-030		
95-2	2253		8.7	12.1	3.1	0.4	10.3	11.7	170	210			6.6	Base	Side Ntch	4	NV				CCO-458W	N126/W110	030-040		
95-2	2254		24.5	10	3.3	0.7	7.9	9	140	210	1	1.5	4.7	Complete	Side Ntch	5	NV				CCO-458W	N126/W110	030-040		
95-2	2296		21.1	14.6	3.7	0.9	6.2	6.6	95	170	2	1	6.2	Complete	Stemmed	5	NV				CCO-458W	N126/W110	060-070		
95-2	2382		19.8	13.2	3.5	0.7					1	0.7		Tip		4	NV				CCO-458W	N126/W110	120-130		
95-2	2434		17.4	11.1	3.4	0.6	8.1	7.6	90	200	4	0.8	6.2	Base	Stemmed	5	NV				CCO-458W	N126/W108	060-090		Feat. 1
95-2	2475		20	11.3	3.5	0.7	7.9	11.1	160	210	2	1.5	5.2	C. Comp	Side Ntch	4	NV				CCO-458W	N122/W108	000-000		Feat. 10
95-2	2568	SA-49	10.3	12	3.2	0.4	7.8	10.1	160	200			3.2	Base	Side Ntch	5	NV				CCO-458W	SURFACE	-		
95-2	2578	SA-50	14	13.1	4.1	0.8					3	1.3		Midsec.		5	NV				CCO-458W	-	000-000		
95-2	2581		17.6	11	4.4	0.6	8.3	11.1	140	200	5	1	7.2	Complete	Side Ntch	5	NV				CCO-458W	N126/W105	000-000		
95-2	2602		18.4	12.8	3.7	0.5	6		150	180	1	1.7		C. Comp	Side Ntch	5	NV				CCO-458W	SURFACE			
95-2	2798		36.4	11.7	5.2	1.6	9.2	10	140	210	1	1.1	3.5	Complete	Side Ntch	5	NV				CCO-458W	EXPMTX			B-2
95-2	2807		20.7	23.8	5.5	2.3	14.6	16.7	130	150	1	3.8	5.6	Base	Corner Ntch	3	NV				CCO-458W	-	-		
95-6	14	BB	26.6	12.8	3.4	1	11.4	12.7	150	210			6.4	Complete	Side Ntch	4	NV	94-H1389	3	1.9	CCO-636	SURFACE	000-000		
95-8	2017		57.6	12.8	5	2.7	7.7	7.4	90	200	11	1.5	5.3	Complete	Stemmed	5	NV	95-H1544	37	2.1	CCO-696N	BURMTX	147-147	D-M5	B-159
95-8	3003	A	23.3	8.9	2.6						1	0.5		Tip		5	NV				CCO-696N	BURMTX	380-380	D-M4	B-157
95-8	3003	B	19	12.6	3.4		7.2	10.7	140		3	1.1	7.9	Base	Stemmed	4	NV	95-H1544	38	2.1	CCO-696N	BURMTX	126-126	D-M5	B-157

Large Projectile Points

Acc #	Cat #	Sub	PSA degrees	DSA degrees	Length (mm)	Width (mm)	Thick (mm)	Nk Wdth (mm)	Stm Wdth (mm)	Ser Sz (mm)	Ntch Wdth (mm)	Ntch Dpth (mm)	Stem Lngth (mm)	Wt. (gms)	Portion	Type	Arr. cm	Ct.	Source	Material	Hyd. Lab	#	Band 1	Site	Unit	Depth	Context	Feat.	Datum
95-2	687				49.7	20.5	10.6						14.1	11.2	Complete	Leaf	3	1	V	QTZ				CCO-458W	N122/W110	030-040			
95-7	232		110	230	31.5	21.5	5.6	15.1	19.6		11.5	2.5	13.3	5	Base	Expanding Stem	3	1	V	QTE				CCO-637	S33/W3	052-070			
95-7	395				51.4	18.4	10.5			1.8			19.3	8.7	Complete	Leaf	3	1	V	AN	96-H1544	33	NVB	CCO-637	-				
95-7	400	B	210	85	31.5	19	6.9	14.4	11.8		7.1	0.4	11.6	3.5	Base	Side Notched	3	1	V	NV	95-H1544	36	3.0	CCO-637		102-102	Assoc.	B-7	D-M4
95-7	401	A	100	200	49.1	19.6	11.1	11.6	14.5		6.1	2.5	13.7	8.9	Complete	Side Notched	3	1	V	CT				CCO-637		102-102	Assoc.	B-7	D-M4
95-7	402		130	200	40.6	19.1	7.2	12.7	14.8		6.2	2.1	11.8	5.3	Complete	Side Notched	3	1	V	CT				CCO-637		52-52	Assoc.	B-5	D-M4
95-8	144		80	220	40.9	19.9	5.9	11.6	11.1				11.5	4.4	Complete	Contracting Stem	3	1	V	CT				CCO-696W	-		Assoc.	B-107	
95-8	612				49.1	25.4	7.5						25.9	8.5	Complete	Shouldered Lanceolate	3	1	XRF	AN	95-H1544	39	0.9	CCO-696W	-	100-100	Expmtx	F-20	
95-8	659		130	250	19.5	18.1	9.2	15.9	18.7		6.9	1.3	6.6	2.5	Base	Side Notched	3	1	V	CT				CCO-696W	S2.5/E22	090-100			
95-8	1199	T-05	90	230	63.6	34.3	13.9	22.4	22.6				12.7	26.2	Complete	Wide-stemmed	3	1	XRF	NV	95-H1430	24	6.9	CCO-696D	NW-1	340-390			
95-8	1741		105	240	21.6	18.1	8.5	11.4	11.7		5.9	0.4	16	3	Base	Side Notched	3	1	V	NV	95-H1544	51	3.8	CCO-696W	BK-5/7	095-095			BS
95-8	1742		130	220	40.6	23.8	10.2	17.7	18.3		4.4	1.2	10	9.4	Base	Side Notched	3	1	V	AN	95-H1544	52	1.2	CCO-696W	BK-5/7	108-108			BS
95-8	1779		110	190	21.6	15	6.4	10.3	11.4		4.7	1.2	11.5	2	Base	Side Notched	3	1	V	NV	95-H1544	53	4.5	CCO-696W	EX1	060-100			
95-8	1804				15.7	16.9	7.1				7.6	1.8	15.7	2.1	Base	Concave Base	3	1	V	CT				CCO-696W	EX2				
95-8	1825				40.9	25	9.1				14	6.7	20.6	9.1	Base	Concave Base	3	1	V	NV	95-H1544	54	4.3	CCO-696W	EX2	080-080			
95-8	2019				50.3	30.4	9.3						22.5	14.4	C. Comp	Shouldered Lanceolate	3	1	V	NV	95-H1544	59	2.6	CCO-696D		352-352	N14E@88M		D-M6

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Desc.	Arr. cm	Ct	Srce I. D.	Source	Hyd. Lab	#	Band 1	Band 2	Site	Unit	Unit sz.	Depth	Mesh Sz.	Context	Area	Feature	Layer	Remarks
95-2	5		5.1	7	2.7	0.1	Margin	3	1	V	NV					CCO-458W	N120/W106	1MX2M	000-010	1/4"					
95-2	38		27.4	18.4	6.2	2.5	Midsec.	4	1		CT					CCO-458W	N120/W106	1MX2M	020-030	1/4"					Heat Spalled
95-2	39		2.2	21.8	6	2.5	End	2	1	V	NV					CCO-458W	N120/W106	1MX2M	020-030	1/4"					
95-2	55		33.4	11.8	7.8	2.8	Margin	3	1		CT					CCO-458W	N120/W108	1MX2M	000-010	1/4"					
95-2	98		18	7.2	7.1	0.7	Margin	2	1	V	NV					CCO-458W	N120/W108	1MX2M	010-020	1/4"					
95-2	104		13.3	11.3	3.4	0.5	Midsec.	4	1	V	NV					CCO-458W	N120/W108	1MX2M	020-030	1/4"					
95-2	105		28.4	17.9	11	4.9	Midsec.	2	1	V	NV					CCO-458W	N120/W108	1MX2M	020-030	1/4"					
95-2	149		13	7.9	6.1	0.4	Margin	3	1	V	NV					CCO-458W	N122/W106	1MX2M	010-020	1/4"					
95-2	210		12.8	10	3.4	0.4	End	4	1	V	NV					CCO-458W	N124/W107	1MX2M	000-020	1/4"					
95-2	211		13.2	8.6	2.5	0.2	Tip	5	1	V	NV					CCO-458W	N124/W107	1MX2M	000-020	1/4"					
95-2	212		22	17.5	6.1	2.4	End	2	1	V	NV					CCO-458W	N124/W107	1MX2M	000-020	1/4"					
95-2	300		11.3	7.5	3	0.2	Tip	5	1	V	NV					CCO-458W	N124/W107	1MX2M	040-050	1/4"					
95-2	301		11.5	8.3	3	0.2	Tip	5	1	V	NV					CCO-458W	N124/W107	1MX2M	040-050	1/4"					
95-2	309		22.5	13.3	4.3	0.9	Margin	3	1	V	NV					CCO-458W	N124/W107	1MX2M	040-050	1/4"					Overshot Flake
95-2	317		8.7	9.2	2.6	0.2	Midsec.	5	1	V	NV					CCO-458W	N120/W105	1MX2M	000-010	1/4"					
95-2	321		8.9	9.3	3.1	0.1	Margin	5	1	V	NV					CCO-458W	N120/W105	1MX2M	000-010	1/4"					
95-2	323		13.3	13.4	8.1	0.9	End	3	1	V	NV					CCO-458W	N120/W105	1MX2M	000-010	1/4"					
95-2	347		15	21.3	4.9	1.6	End	3	1	V	NV					CCO-458W	N120/W105	1MX2M	010-020	1/4"					Cortex
95-2	372		15.1	16.6	6.8	1.2	Tip	3	1	V	BL					CCO-458W	N120/W105	1MX2M	020-030	1/4"					
95-2	377		16.3	11.5	7.5	1.2	End	2	1	V	NV					CCO-458W	N120/W105	1MX2M	020-030	1/4"					
95-2	392		12.7	8.7	3.2	0.3	Tip	5	1	V	NV					CCO-458W	N122/W108	1MX2M	000-010	1/4"					
95-2	416		10.8	20	6.1	1.2	End	2	1	V	NV					CCO-458W	N122/W108	1MX2M	010-020	1/4"					
95-2	417		10.3	20.1	6.9	1.4	Midsec.	2	1	V	NV					CCO-458W	N122/W108	1MX2M	010-020	1/4"					
95-2	420		9.7	8.2	2.8	0.1	Tip	5	1	V	NV					CCO-458W	N122/W108	1MX2M	010-020	1/4"					
95-2	462		6.6	11.1	4.3	0.3	Margin	3	1	V	NV					CCO-458W	N122/W108	1MX2M	030-040	1/4"					
95-2	483		20	21.8	5.2	2.8	Midsec.	3	1	V	NV					CCO-458W	N124/W105	1MX2M	000-010	1/4"					
95-2	486		28.9	10.2	4.2	1.1	Tip	3	1	V	NV					CCO-458W	N124/W105	1MX2M	000-010	1/4"					
95-2	530		13.1	12.3	5.8	0.7	Margin	2	1	V	NV					CCO-458W	N120/W107	1MX2M	020-030	1/4"					
95-2	562		9.6	9	3.3	0.3	Margin	5	1	V	NV					CCO-458W	N122/W105	1MX2M	000-010	1/4"					
95-2	576		14.1	14.2	2.6	0.5	Tip	3	1	V	NV					CCO-458W	N122/W105	1MX2M	010-020	1/4"					
95-2	578		8.6	10.5	2.5	0.2	End	4	1	V	NV					CCO-458W	N122/W105	1MX2M	010-020	1/4"					
95-2	604		12.9	8	2.4	0.2	Tip	5	1	V	NV					CCO-458W	N122/W105	1MX2M	020-030	1/4"					
95-2	620		7.2	6.2	3.5	0.2	Tip	5	1	V	NV					CCO-458W	N122/W105	1MX2M	030-040	1/4"					
95-2	633		11	8.5	3.5	0.3	Tip	5	1	V	NV					CCO-458W	N122/W110	1MX2M	000-010	1/4"					
95-2	634		22.3	11.4	3.6	0.7	Tip	4	1	V	NV					CCO-458W	N122/W110	1MX2M	000-010	1/4"					
95-2	724		15.8	11.8	4.1	0.5	End	3	1	V	NV					CCO-458W	N122/W110	1MX2M	050-060	1/4"					
95-2	757		15.9	12.5	2.9	0.4	Tip	5	1	V	NV					CCO-458W	N122/W107	1MX2M	000-010	1/4"					
95-2	758		17.9	7.5	2.5	0.2	Midsec.	5	1	V	NV					CCO-458W	N122/W107	1MX2M	000-010	1/4"					
95-2	803		18.7	10.4	2.4	0.3	Tip	5	1	V	NV					CCO-458W	N122/W107	1MX2M	020-030	1/4"					
95-2	804		6.9	10.3	3.4	0.2	Midsec.	5	1	V	NV					CCO-458W	N122/W107	1MX2M	020-030	1/4"					
95-2	827		10.2	9.9	3.1	0.4	End	5	1	V	NV					CCO-458W	N126/W106	1MX2M	000-010	1/4"					
95-2	842		10.2	9	2.4	0.3	Margin	4	1	V	NV					CCO-458W	N126/W106	1MX2M	010-020	1/4"					
95-2	866		13.9	11.8	3	0.5	End	4	1	V	NV					CCO-458W	N126/W106	1MX2M	020-030	1/4"					
95-2	981		22	9.6	5.5	0.8	Margin	3	1	V	AN					CCO-458W	N122/W104	1MX2M	000-010	1/4"					Cortex
95-2	1007		13.1	15.9	5.5	0.8	End	3	1	V	NV					CCO-458W	N124/W105	1MX2M	010-020	1/4"					
95-2	1008		15.2	11.2	4.6	0.7	Tip	3	1	V	NV					CCO-458W	N124/W105	1MX2M	010-020	1/4"					
95-2	1009		13.1	14.9	4.4	0.7	End	3	1	V	NV					CCO-458W	N124/W105	1MX2M	010-020	1/4"					
95-2	1033		6.6	10.3	3.5	0.2	Midsec.	4	1	V	NV					CCO-458W	N124/W105	1MX2M	020-030	1/4"					
95-2	1062	E	18.6	7.9	4.4	0.5	Margin	3	1	V	AN					CCO-458W	N124/W105	1MX2M	030-040	1/4"					
95-2	1079		15.1	11.6	2	0.2	Tip	5	1	V	NV					CCO-458W	N124/W105	1MX2M	040-050	1/4"					Uniface
95-2	1117		11	14.8	5.2	0.9	Midsec.	3	1	V	NV					CCO-458W	N124/W105	1MX2M	060-070	1/4"					
95-2	1132		6.6	19	4.7	0.5	End	3	1	V	NV					CCO-458W	N124/W105	1MX2M	070-080	1/4"					
95-2	1172		6.8	16.1	7.1	0.5	Margin	3	1	V	NV					CCO-458W	N124/W105	1MX2M	110-120	1/4"					
95-2	1177		11.5	9.9	1.6	0.1	Tip	5	1	V	NV					CCO-458W	N124/W105	1MX2M	110-120	1/4"					Uniface
95-2	1255		6.9	7.6	2.9	0.2	Margin	5	1	V	NV					CCO-458W	N124/W109	1MX2M	010-020	1/4"					Cortex
95-2	1256		12.9	19	2.3	0.2	Tip	4	1	V	NV					CCO-458W	N124/W109	1MX2M	010-020	1/4"					

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Desc.	Arr. cm	Ct	Srce I. D.	Source	Hyd. Lab	#	Band 1	Band 2	Site	Unit	Unit sz.	Depth	Mesh Sz.	Context	Area	Feature	Layer	Remarks
95-2	1272		26.6	17.6	6.3	2.7	End	2	1	V	NV					CCO-458W	N124/W109	1MX2M	020-030	1/4"					Cortex
95-2	1275		18.7	11	8.6	1.1	Margin	2	1	V	NV					CCO-458W	N124/W109	1MX2M	020-030	1/4"					
95-2	1316		6.6	11.8	4.1	0.3	Midsec.	5	1	V	NV					CCO-458W	N124/W109	1MX2M	040-050	1/4"					
95-2	1480		15.6	10.5	7.5	1.2	Margin	2	1	V	NV					CCO-458W	N126/W103	1MX2M	999-999	1/4"	Expmtx		B-1		
95-2	1576		11.5	10.1	3	0.3	Margin	5	1	V	NV					CCO-458W	N125/W105	1MX2M	010-020	1/4"					
95-2	1578		8.1	12.3	5.4	0.5	Margin	3	1	V	BH					CCO-458W	N125/W105	1MX2M	010-020	1/4"					
95-2	1640		9.8	7.1	2.5	0.1	Tip	5	1	V	NV					CCO-458W	N126/W108	1MX2M	000-010	1/4"					
95-2	1641		27.4	17.6	7.2	3.2	End	2	1	V	NV					CCO-458W	N126/W108	1MX2M	000-010	1/4"					
95-2	1682		13.6	11.5	3.7	1.3	End	4	1	V	NV					CCO-458W	N126/W108	1MX2M	020-030	1/4"					
95-2	1683		16	25.1	5.5	2.4	Midsec.	2	1	V	NV					CCO-458W	N126/W108	1MX2M	020-030	1/4"					
95-2	1857	SA 14	16.4	19	7.9	2.7	End	2	1	V	NV	94-H1386	14	3.4		CCO-458W	SURFACE	-	000-000	-	SA 14	SURF			
95-2	1858	SA 15	35.1	24.3	12.5	9.3	End	3	1	V	NV	94-H1386	15	3.1		CCO-458W	SURFACE	-	000-000	-	SA 15	SURF			
95-2	1885	SA 41B	10.4	18.7	4.6	0.8	End		1	V	NV	94-H1386	42	1.1		CCO-458/H	SURFACE	-	000-000	-	SA 41B	SURF			
95-2	1895		7	11.5	4.7	1	Midsec.	5	1	V	NV					CCO-458W	N122/W110	1MX2M	999-999	1/4"					
95-2	1900		10.7	17.2	3.6	0.7	End	4	1	V	NV					CCO-458W	N126/W104	1MX2M	000-010	1/4"					
95-2	1906		11.2	26.2	6	1.5	Midsec.	2	1	V	BL					CCO-458W	N126/W104	1MX2M	000-010	1/4"					
95-2	1923		11.2	9.9	3.3	0.4	Midsec.	4	1	V	NV					CCO-458W	N126/W104	1MX2M	010-020	1/4"					Uniface
95-2	1940		14.1	11.7	2.7	0.3	Tip	5	1	V	NV					CCO-458W	N126/W104	1MX2M	020-030	1/4"					
95-2	1953		22.7	20.3	18.6	2.5	Margin	2	1	V	NV					CCO-458W	N126/W104	1MX2M	030-040	1/4"					
95-2	1954		9.5	8.3	2.5	0.2	Margin	5	1	V	NV					CCO-458W	N126/W104	1MX2M	030-040	1/4"					
95-2	1967		9.3	10.1	3.1	0.2	Tip	5	1	V	NV					CCO-458W	N126/W104	1MX2M	040-050	1/4"					
95-2	1990		12.4	10.1	2.4	0.2	Tip	5	1	V	NV					CCO-458W	N80/W120	1MX1M	000-020	1/4"					
95-2	2016		6.2	8	2.5	0.1	Midsec.	4	1	V	NV					CCO-458W	N110/W130	1MX1M	000-020	1/4"					
95-2	2059		6.7	10.7	3.4	0.5	Tip	4	1	V	NV					CCO-458W	N130/W100	1MX1M	000-020	1/4"					
95-2	2061		18.1	12.2	7.6	1.2	Tip	3	1	V	NV					CCO-458W	N130/W100	1MX1M	000-020	1/4"					
95-2	2099		13.6	12.3	4.1	0.7	Midsec.	3	1	V	NV					CCO-458W	N130/W80	1MX1M	000-020	1/4"					
95-2	2148		50.7	18.7	8.5	8	Tip	3	1		CT					CCO-458W	N160/W110	1MX1M	000-020	1/4"					Uniface
95-2	2190		13.9	12.4	2.4	0.3	Tip	4	1	V	NV					CCO-458W	N124/W108	1MX2M	000-000	1/4"					
95-2	2295		42.2	21	9.4	7.5	Midsec.	3	1		CT					CCO-458W	N126/W110	1MX2M	060-070	1/4"					
95-2	2561		10.2	22.3	7	1	End	2	1	V	NV					CCO-458W	SURFACE	-	000-000	-	SA-44	SURF			
95-2	2564		38.8	31.5	9.4	10	Midsec.	3	1		UK					CCO-458W	SURFACE	-	000-000	-	SA-47	SURF			
95-2	2565	SA-46	29.1	19.2	5.2	2.6	Tip	3	1	V	BH	96-H1544	25	3		CCO-458E	SURFACE	-	000-000	SA-48	East				
95-2	2605		10.7	6.7	2.8	0.2	Tip	5	1	V	BH					CCO-458W	N126/W104	1X2M	018-018	1/4"					
95-2	2629		30.2	13.7	8.1	3	Midsec.	3	1	V	BH	96-H1544	23	3.1		CCO-458E	N194/E20	.5MX2M	000-020	1/4"	East				Ribbon Flaked
95-2	2638		26.2	15.8	6.3	2.5	Tip	4	1	V	BH	96-H1544	24	4.1		CCO-458E	N198/E20	.5MX2M	000-020	1/4"	East				
95-2	2652		28.1	14.3	7.6	3	End	2	1	V	NV	96-H1544	22	2.4		CCO-458E	N204/E10	.5MX2M	000-020	1/4"	East				
95-2	2689		25.2	7.1	5.1	0.7	Margin	3	1	V	BH	96-H1544	26	3.2		CCO-458E	N196/E20	1X2M	010-020	1/4"	East				
95-2	2696		23.6	13.8	4.8	1.5	Margin	3	1	V	NV	96-H1544	27	2.5		CCO-458E	N196/E20	1X2M	050-060	1/4"	East				
95-2	2743		10.2	15.1	5	0.6	Midsec.	4	1	V	BH	96-H1544	28	DH		CCO-458E	N200/E20	1MX2M	040-050	1/4"	East				
95-2	2756		6.1	26.2	6.7	1	Margin	3	1	V	NV	96-H1544	29	3		CCO-458E	N204/E20	1MX2M	010-020	1/4"	East				
95-2	2806		53.1	21	9.2	11.6	Tip	3	1	V	NV					CCO-458W	-	-	000-000	-					
95-2	2808		27.5	19.6	8.2	3.5	Tip	3	1	V	NV					CCO-458W	-	-	000-000	-					
95-2	2809		48.6	20.9	8.9	8.8	Tip	1	1		ST					CCO-458W	-	-	000-000	-					
95-6	15	CC	8.9	5.7	2.2	0.1	Tip	5	1	V	NV	94-H1389	4	2.9		CCO-636	SURFACE	-	000-000	-					
95-7	81		17.4	12	7.1	0.8	Tip	4	1	XRF	NV	96-H1518	1	2.8		CCO-637	S27/W3	1MX2M	070-080	1/4"					
95-7	192		40.4	12.4	6.4	2.8	Margin	3	1	V	NV	96-H1544	32	3.5		CCO-637	S31/W3	1MX2M	080-090	1/4"					
95-7	297		27.2	19.1	10	5.8	Midsec.	3	1		CT					CCO-637	TRENCH	-	080-090	-					
95-7	299		17	11.8	8.3	1.5	End	3	1		CT					CCO-637	TEST EXP.			-	Spoils				
95-7	348	GG	14.5	9.9	4.6		Tip	3	1	XRF	NV	95-H1390	24	2.7		CCO-637	TR4-27-1	-	060-080	-	28-32M		B-7	D-M4	
95-7	417	C	12.1	11.6	5.1		Margin	4	1	V	NV	96-H1544	31	3.0		CCO-637			102-102		Burmtx		B-43		
95-8	68		16.1	12.5	8.2	1.6	Margin	4	1	XRF	NV	96-H1519	4	7.0		CCO-696W	-	-		-	Burmtx		B-83		
95-8	127		25	21.5	8.1	5.6	Midsec.	3	1		CT					CCO-696W	-	-		-	Burmtx		B-86		
95-8	132		23.7	21.2	10.4	4.5	End	4	1	XRF	NV	96-H1519	12	2.8		CCO-696W	-	-		-	Burmtx		B-104		
95-8	154		13.4	11.1	7.8	0.7	Tip	5	1	XRF	BH	96-H1519	13	2.2		CCO-696W	-	-		-	Expmtx		B-147		
95-8	173		12.4	20.7	5.2	1.2	End	3	1		CT					CCO-696W	-	-		-	Burmtx		B-12		
95-8	201		25.1	15.4	4.1	1.7	Tip	1	1		ST					CCO-696W	S3/W2	2MX2M		1/4"	Expmtx		B-27		

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Desc.	Arr. cm	Ct	Srce I. D.	Source	Hyd. Lab	#	Band 1	Band 2	Site	Unit	Unit sz.	Depth	Mesh Sz.	Context	Area	Feature	Layer	Remarks
95-8	288		14.6	17.8	7.5	1.9	Midsec.	3	1	XRF	NV	96-H1519	18	4.8		CCO-696W	-	-			Expmtx		B-30		
95-8	298		7.6	6.5	8.4	1.1	Margin	4	1	XRF	BH	96-H1519	19	1.8		CCO-696W		-			Expmtx		B-37		
95-8	312		19.1	16.7	7.2	2	Margin	4	1	XRF	BH	96-H1519	20	2.0	4.1	CCO-696W		-		-	Burmtx		B-2		
95-8	390	U	19.8	20.4	9.1	3.5	Midsec.	4	1	XRF	NV	95-H1430	21	3.0		CCO-696W	-	-			Expmtx		B-4		
95-8	398	C	13.2	15.3	8.8	0.8	End	3	1	XRF	NV	95-H1430	3	2.4		CCO-696W				-	Expmtx		B-113		
95-8	407		17.7	22.6	9.9	3.3	Margin	2	1	V	NV					CCO-696W		-			Expmtx		B-139		
95-8	432		12.7	7.4	5.7	0.6	Margin	4	1	V	NV	96-H1508	31	10.4		CCO-696W		-			Burmtx		B-153		Rough Serrations
95-8	456		27.7	17.3	9.2	3.5	Tip	3	1	V	AN					CCO-696W	-	-		-	Expmtx		B-18		
95-8	543		49.5	32.8	6.9	11.9	Margin	1	1		ST					CCO-696W	-				Burmtx		F-20		
95-8	613		15.1	8.6	5	0.6	End	4	1	XRF	NV	96-H1519	28	2.6		CCO-696W	-	-		-			F-19	D-M3	
95-8	644		11.9	14.5	8.1	1.4	Midsec.	3	1		CT					CCO-696W	EX-1.2	-	092-092	-	S13W	29.2			
95-8	670		18.4	13.1	7.4	2	Midsec.	3	1	V	BH	96-H1544	40	1.2		CCO-696E	S2.5/E22	2MX2M	100-110	1/4"					
95-8	702		9.5	15.5	7.4	1.3	Midsec.	3	1	V	BH	96-H1544	41	3.8		CCO-696E	S2.5/E20	2MX2M	040-050	1/4"					
95-8	750		29.1	28.4	11.2	9.6	End	3	1		CT					CCO-696W	N0/W5	2MX2M	110-120	1/4"					Heat Spalled
95-8	759		19.1	23.6	12.2	4.9	Midsec.	3	1		CT					CCO-696W	N0/W5	2MX2M	120-130	1/4"					
95-8	847		9.1	13.2	3.9	0.4	End	3	1	V	NV					CCO-696W	S3/W2	2MX2M	080-090	1/4"					
95-8	878		12.5	19.9	9.1	1.8	Margin	4	1	V	NV	96-H1544	42	2.7		CCO-696W	S6/W2	2MX2M	070-080	1/4"					
95-8	892		1.2	16.7	8.1	1.3	Margin	4	1	V	NV					CCO-696W	S6/W2	2MX2M	080-090	1/4"					
95-8	902		11.4	7.8	7.4	0.6	Margin	4	1	V	NV	96-H1544	43	2.5		CCO-696W	S8/E9.5	1.5X1M	060-075	1/4"					
95-8	937		26.4	20.6	12.2	5.8	Tip	3	1		CT					CCO-696W	S3/W5	2MX2M	080-090	1/4"					
95-8	969		25.1	14.7	6.4	1.8	Tip	3	1	V	AN	96-H1544	44	1.1		CCO-696E	S2.5/E28	1MX2M	000-010	1/4"					
95-8	998		6.5	7.9	5.1	0.2	Margin	3	1	V	BH	96-H1544	45	DH		CCO-696E	S2.5/E28	1MX2M	070-080	1/4"					
95-8	1042		16.2	17.2	8.2	2.4	Midsec.	3	1	V	NV	96-H1544	46	1.2		CCO-696E	S2.5/E25	2MX2M	130-140	1/4"					
95-8	1050		9.4	20.5	7.1	0.9	Margin	3	1	V	BL?	96-H1544	47	DH		CCO-696E	S2.5/E25	2MX2M	140-150	1/4"				BD	
95-8	1074		16	17.3	9.1	1.8	Margin	4	1		CT					CCO-696W	S9/W2	2MX2M	070-080	1/4"				BD	
95-8	1081		20.5	11.1	8.2	1.8	Tip	4	1		CT					CCO-696W	S9/W2	2MX2M	080-090	1/4"				BD	
95-8	1082		11.3	10.7	7.2	0.8	End	4	1		CT					CCO-696W	S9/W2	2MX2M	080-090	1/4"					
95-8	1106		18.4	19.3	9.8	3.6	End	2	1	V	AN	96-H1544	48	1.2		CCO-696W	S9/E9	2MX2M	058-070	1/4"				BD	
95-8	1149		21.8	19.4	8.5	4	Midsec.	3	1		CT					CCO-696E	S9/E18	2MX2M	053-060	1/4"					
95-8	1172		24.9	17.1	6.8	2.9	Midsec.	3	1	V	NV	96-H1544	49	NVB		CCO-696E	S9/E18	2MX2M	090-100	1/4"				BS	
95-8	1271	A	15.3	17.7	10.5		End	3	1	XRF	NV	95-H1430	1	2.5		CCO-696W	TR5-2-12	-	040-060	-					
95-8	1296	T-01	43.2	17.9	7.5	5.5	Tip	3	1	XRF	BH	95-H1430	22	3.3		CCO-696D	TR7-27-1	-	327-327	-					
95-8	1309		17.9	13.9	4.3	0.7	Tip	4	1	XRF	NV	96-H1519	31	1.9		CCO-696D	TR7-27-1	-	380-400						
95-8	1315		37.1	17.5	9.4	5.1	Tip	3	1	V	NV?					CCO-696W	TR6-16-1	-	-	-					
95-8	1327		14.8	18.1	5.8	1.9	Midsec.	3	1	V	BH					CCO-696W	TRENCH	-	-	-				BD	
95-8	1352		15.1	18.7	7.6	1.9	Midsec.	3	1		CT					CCO-696W	EXP-1	-	106-106	-	S28W	9.6M		M3	
95-8	1361		30.2	23.1	10.6	8.1	Tip	3	1		QZ					CCO-696W	EXP-2	-	103-103	-	S5E	27.6M		D-M3	
95-8	1397		40.4	22.9	8	7	Midsec.	3	1	V	NV					CCO-696W	EXP-5	-	073-073	-	S35W	36.85		D-M3	
95-8	1429		65.1	29.9	5.5	15.8	Cond. Comp	1	1		ST					CCO-696W	BK-5/7	-	121-121	-	S32W	50.25M			
95-8	1455		6.6	8.8	4.4	0.3	Midsec.	3	1	V	NV					CCO-696W	M5S	.5MX.5M	040-050	1/8"					
95-8	1611		34.9	25.8	8.6	5.8	Midsec.	3	1	V	NV					CCO-696W	M20S	.5MX.5M	040-050	1/8"				BS	
95-8	1726		7.1	14.7	8.1	0.6	Margin	4	1	V	NV					CCO-696W	BK-1/5	-	080-080	-					
95-8	1770		15.8	19.6	6.7	2.1	Midsec.	4	1	V	NV					CCO-696W	EX1	-	060-100	-					
95-8	1771		17.1	19.3	7.7	2.5	Midsec.	3	1	V	BH					CCO-696W	EX1	-	060-100	-					
95-8	1780		20.5	18.5	6.1	2.3	Midsec.	3	1		CT					CCO-696W	EX1	-	060-100	-					
95-8	1786		44.4	19.4	8.6	7.7	Margin	1	1		ST					CCO-696W	EX1/EX2	-	-	-					
95-8	1797		113.1	21.4	6.4	1.3	End	3	1	V	BH					CCO-696W	EX2	-		-					
95-8	1799		27	18.7	9.1	5.2	Midsec.	3	1	V	NV					CCO-696W	EX2	-	-	-					
95-8	1801		12.6	10.7	5.9	0.8	Margin	3	1	V	NV					CCO-696W	EX2	-		-					
95-8	1802		18.2	12.8	5.4	1.2	Midsec.	3	1	V	NV					CCO-696W	EX2	-		-					
95-8	1803		12.7	14.9	8.7	1.2	Margin	3	1	V	NV?					CCO-696W	EX2	-		-					Ribbon Flaked
95-8	1812		52.5	32.7	7	14.8	Midsec.	3	1	XRF	BH	96-H1519	1	3.4		CCO-696W	EX2	-	100-100	-					
95-8	1816	B	17.6	10.5	5.4	1	Tip	3	1	XRF	BH	95-H1430	2	4.3		CCO-696W	EX2	-		-					
95-8	1838		121.3	30.5	11.1	36.8	Complete	2	1	XRF	NV	96-H1544	55	1.9		CCO-696W	EX2	-	060-070	-					
95-8	1853		20.3	13.2	7.8	1.8	End	2	1	V	BH					CCO-696W	EX2	-	060-060	-					
95-8	1861		10.8	18.9	7.9	1.7	Midsec.	4	1	V	BH?					CCO-696W	EX3	-		-					

Bifaces 4 of 4

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Desc.	Arr. cm	Ct	Srce I. D.	Source	Hyd. Lab	#	Band 1	Band 2	Site	Unit	Unit sz.	Depth	Mesh Sz.	Context	Area	Feature	Layer	Remarks
95-8	1867		35.8	18.3	8.6	5	Tip	3	1	V	NV	96-H1544	56	1.9		CCO-696W	EX4	-		-					
95-8	1882		1.7	13.7	10.5	1.7	Margin	3	1	V	BH					CCO-696W	EX5	-		-					
95-8	1900		26.3	21.7	7.5	3.8	Tip	3	1	V	BH	96-H1544	57	4.3		CCO-696W	EXP-5	-	060-100						
95-8	1912		13.2	13.8	5.2	0.7	End	3	1	V	NV					CCO-696W	EXP-6	-	060-100	-					
95-8	1919	J	20.5	20.5	7.9	3.3	Midsec.	3	1	XRF	NV	95-H1430	10	2.8		CCO-696W	-	-		-					
95-8	1928		25	17.5	10	3.8	Midsec.	2	1	V	NV					CCO-696W	SPOILS	-		-					
95-8	1933		24.4	15	9.7	3	Margin	3	1	V	NV					CCO-696W	SPOILS	-		-					
95-8	1935		16.9	16.4	9.3	2.8	Midsec.	2	1	V	NV	96-H1544	58	4.2		CCO-696W	EXP-2	-	150-150	-	S87E	36M			

Cores 1 of 2

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Form	Material	Unidir.	Multidir.	Crshd	Plshd	Cbl Ctx	Backed	Remarks	Count	Site	Unit	Unit size	Depth	Mesh	Context	Dist.	Feature	Datum
95-12	5		65.6	61.5	46.5		Core	Siltstone	1							1	OFFSITE	Diversion Area		2Ab					
95-12	43		82.2	63.9	42.2	195.2	Core	Dacite	1				1			1	OFFSITE	Debris Flow							
95-2	65		52	36.6	29.9	49.2	Core	Siltstone		1						1	CCO-458W	N120/W108	1MX2M	000-010	1/4"				
95-2	1356		43	34.3	30.8	34.2	Core	Quartzite		1						1	CCO-458W	N126/W103	1MX2M	000-010	1/4"				
95-2	2575		43	41.3	22.7	41.3	Core	Chert		1			1		Bifacial	1	CCO-458W	Surface	-	000-000	-	SA-56	SURF		
95-2	2659		75.6	57.7	37.6	198.4	Core	Chert		1						1	CCO-458E	N202/E10	.5MX2M	000-020	1/4"				
95-2	2736		101.7	78.5	50.3		Core	Quartzite	1				1			1	CCO-458E	N200/E20	1MX2M	040-050	1/4"				
95-2	2742		86.4	61.1	33.6	191.9	Core	Quartzite	1				1			1	CCO-458E	N200/E20	1MX2M	040-050	1/4"				
95-2	2793		92.2	72	39.5	337.6	Core	Quartzite	1				1			1	CCO-458E	N200/E20	1MX2M	040-050	1/4"				
95-2	2795		62.6	46.6	40.1	171.3	Core	Chert		1						1	CCO-458E	N200/E20	1MX2M	040-050	1/4"				
95-2	2804		53.1	43.9	34.1	108.4	Core	Basalt	1				1			1	CCO-458W	UNIT 6/3	-		-				
95-2	2805		57.8	41.2	18.8	53.1	Core	Chert	1						Spall	1	CCO-458W	UNIT 6/3	-		-				
95-3	1		71.9	51.1	44.3	107.2	Core	Siltstone		1						1	CCO-459	S0/W0	1MX2M	000-010	1/4"				
95-3	75		48.8	42.2	30.3	52.4	Core	Siltstone	1							1	CCO-459	S1/W0	1MX2M	030-040	1/4"				
95-3	164		64.6	52.1	41.2	166.1	Core	Siltstone		1						1	CCO-459	-	-		-				
95-3	167		81	55.4	51	202.8	Core	Quartzite		1			1			1	CCO-459	-	-		-				
95-3	176		70.8	58.4	49	236.2	Core	Siltstone		1						1	CCO-459	-			-				
95-3	177		59.6	48.8	27.1	86.4	Core	Siltstone		1						1	CCO-459	N1.5/E5	1MX2M	050-060	1/4"				
95-3	178		65.1	47.6	20.4	44.7	Core	Siltstone		1					Frag.	1	CCO-459	Trench	-		1/4"				
95-3	179		92.3	77.7	57.9	413.3	Core	Siltstone		1						1	CCO-459	S1/E5	1MX2M	000-010	1/4"				
95-3	180		52.3	44.8	32.4	65.9	Core	Siltstone		1						1	CCO-459	S3/W0	-	000-056	1/4"	BAULK			
95-6	3		66.5	44.2	28	70.8	Core	Quartzite		1						1	CCO-636	N13/W6	1MX2M	010-020	1/4"				
95-7	6		69.7	65.7	51	257.4	Core	Siltstone		1						1	CCO-637	S50/W0	1.4MX1.7M	070-085	1/4"				
95-7	58		57.6	45	28.9	75.9	Core	Quartzite		1			1			1	CCO-637	S38/W0	1MX1M	070-080	1/4"				
95-7	91		57.8	50.3	37	96.9	Core	Dacite		1			1			1	CCO-637	S27/W3	1MX2M	080-090	1/4"				
95-7	93		50.2	49.2	29.2	61.1	Core	Siltstone	1							1	CCO-637	S27/W3	1MX2M	080-090	1/4"				
95-7	142		46.5	37.6	27.3	51	Core	Siltstone		1						1	CCO-637	S29/W3	1MX2M	059-070	1/4"				
95-7	215		63	53.7	32	93.4	Core	Siltstone	1							1	CCO-637	S31/W3	1MX2M	110-120	1/4"				
95-7	307		75.5	50	38.1	137.1	Core	Basalt	1				1			1	CCO-637	S22/W1	0.6MX4M	060-080	1/4"				
95-7	312		56.6	43	38.8	84.5	Core	Siltstone		1						1	CCO-637	S26/W1	0.6MX4M	060-080	1/4"				
95-7	353		57.9	45.8	35.5	110.8	Core	Siltstone	1							1	CCO-637	S50/W1	0.6MX4M	060-080	1/4"				
95-7	368		39.4	32.7	20.1	31.2	Core	Quartzite		1			1			1	CCO-637	S33/W3	1MX2M	080-090	1/4"				
95-7	369		50.6	43.5	27.3	56.1	Core	Quartzite	1							1	CCO-637	S33/W3	1MX2M	080-090	1/4"				
95-7	373		57.4	37.7	32.3	68.7	Core	Chert	1				1			1	CCO-637	S10/W0	1MX2M	040-050	1/4"				
95-7	374		39.7	32.7	24.1	21.5	Core	Chert		1						1	CCO-637	S27/W3	1MX2M	050-070	1/4"				
95-7	382		35.3	27.6	19.4	16.8	Core	Chert		1			1			1	CCO-637	S31/W3	1MX2M	130-140	1/4"				
95-7	386		38.2	35.7	26	52.6	Core	Chert	1							1	CCO-637	S42/W1	0.6MX4M	060-080	1/4"				
95-7	387		46.5	40.1	22.9	31.6	Core	Siltstone		1						1	CCO-637	S30/W1	0.6MX4M	060-080	1/4"				
95-7	388		66.8	55.8	32.5	104.4	Core	Siltstone	1							1	CCO-637	S18/W1	0.6MX4M	060-080	1/4"				
95-7	391		62.5	45.6	42.3	94.6	Core	Quartzite	1				1			1	CCO-637	TR4-27-1	-		-	SPOILS			
95-7	392		54.9	46.6	30.9	96.7	Core	Siltstone	1							1	CCO-637	TR4-27-1	-	060-080	-				
95-8	243		92.5	74.7	65	344.7	Core	Siltstone	1							1	CCO-696S	-	-			BURMTX		B-16	
95-8	303		55.5	48.8	27.1	74.4	Core	Quartzite	1				1		Spilt Cobble	1	CCO-696W	-				EXPMTX		B-30	
95-8	316		73.1	55.1	53.7	4.5	Core	Siltstone	1				1		Spilt Cobble	1	CCO-696W	-				BURMTX		B-37	
95-8	353		80	68.3	44.7	228.6	Core	Siltstone	1							1	CCO-696W	-				BURMTX		B-68	
95-8	378		55.7	40.7	28.7	1.4	Core	Petrified Wood	1							1	CCO-696W	-	-		-	BURMTX		B-89	
95-8	387		83.3	72.3	65.5	462.5	Core	Siltstone	1							1	CCO-696W	-				EXPMTX		B-109	
95-8	465		99.6	71.6	41	288.5	Core	Siltstone	1							1	CCO-696W					EXPMTX		B-153	
95-8	466		65.3	58	42.3	127.5	Core	Siltstone	1							1	CCO-696W					EXPMTX		B-153	
95-8	535		70.8	66.3	53.8	353	Core	Siltstone		1						1	CCO-696W	-	-		-	BURMTX		B-9	
95-8	572		83.6	73.3	35.9	254.6	Core	Granite	1							1	CCO-696W	-				BURMTX		B-4	
95-8	580		54	44.2	42.9	113	Core	Chert		1						1	CCO-696W	-				EXPMTX		B-4	
95-8	610		55.7	47.7	41.8	140.1	Core	Siltstone		1						1	CCO-696W	-	-		-			F-20	
95-8	611		54.6	48.9	30.8	89.6	Core	Siltstone	1							1	CCO-696W	-	-		-			F-20	
95-8	628		87.7	60.6	48.2	321.1	Core	Siltstone	1							1	CCO-696W	-	-		-			F-14	
95-8	637		75.8	55.6	48.2	227.8	Core	Siltstone	1							1	CCO-696W	-	-		-			F-17	
95-8	666		67.6	49.2	33.7	126.3	Core	Siltstone	1						Fire Cracked	1	CCO-696E	S2.5/E22	2MX2M	090-100	1/4"				
95-8	667		42.8	34.7	29.8	67.1	Core	Siltstone	1							1	CCO-696E	S2.5/E22	2MX2M	090-100	1/4"				
95-8	677		105.4	54.4	48.6	282.7	Core	Siltstone	1							1	CCO-696E	S2.5/E22	2MX2M	100-110	1/4"				
95-8	678		91.4	58.4	49	195.9	Core	Siltstone	1							1	CCO-696E	S2.5/E22	2MX2M	100-110	1/4"				
95-8	717		45.4	36.8	33	55.7	Core	Chert		1						1	CCO-696E	S2.5/E20	2MX2M	040-050	1/4"				
95-8	755	A	72.7	48.8	42.1	174.1	Core	Chert	1				1		Spilt Cobble	1	CCO-696W	N0/W5	2MX2M	110-120	1/4"				
95-8	756		58	46.7	39.8	82.2	Core	Siltstone		1						1	CCO-696W	N0/W5	2MX2M	110-120	1/4"				
95-8	809		57.8	40	36	88.6	Core	Siltstone	1				1			1	CCO-696W	N0/W2	2MX2M	100-110	1/4"				
95-8	843		71	51.5	27.5	89.6	Core	Quartzite	1				1		Spilt Cobble	1	CCO-696W	S3/W2	2MX2M	070-080	1/4"				
95-8	844		62	53.7	47.4	112.1	Core	Quartzite	1				1			1	CCO-696W	S3/W2	2MX2M	070-080	1/4"				
95-8	887		62.7	54.2	40.2	182.7	Core	Chert	1				1			1	CCO-696W	S6/W2	2MX2M	070-080	1/4"				
95-8	891		66.9	42.6	33.3	138.2	Core	Granite	1							1	CCO-696W	S6/W2	2MX2M	080-090	1/4"				
95-8	903		83	76.6	54.6	352.7	Core	Siltstone		1			1			1	CCO-696W	S8/E9.5	1.5X1M	060-075	1/4"				
95-8	904		78.8	45	41.2	170.1	Core	Siltstone	1							1	CCO-696W	S8/E9.5	1.5X1M	060-075	1/4"				
95-8	921	A	44.1	37.3	30.7	68.5	Core	Dacite		1			1			1	CCO-696W	S3/W5	2MX2M	060-070	1/4"				

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Form	Material	Unidir.	Multidir.	Crshd	Plshd	Cbl Ctx	Backed	Remarks	Count	Site	Unit	Unit size	Depth	Mesh	Context	Dist.	Feature	Datum
95-8	946		89.6	71.3	61	413.1	Core	Chert	1				1			1	CCO-696W	S3/W5	2MX2M	090-100	1/4"				
95-8	991	A	49.1	36.4	35.1	86.5	Core	Chert		1			1			1	CCO-696E	S2.5/E28	1MX2M	050-060	1/4"				
95-8	1032		62.9	57.9	36.3	96.6	Core	Siltstone	1							1	CCO-696E	S2.5/E25	2MX2M	110-120	1/4"				
95-8	1055		79.4	69.6	50.5	292.9	Core	Siltstone	1							1	CCO-696E	S2.5/E25	2MX2M	140-150	1/4"				
95-8	1145		104.6	64.1	64.3	443	Core	Basalt		1						1	CCO-696W	S9/E9	2MX2M	090-100	1/4"				BD
95-8	1185		73	47.7	40.6	147.8	Core	Quartzite	1				1			1	CCO-696E	S9/E18	2MX2M	100-110	1/4"				BD
95-8	1208		64.1	60.7	29.7	154.2	Core	Siltstone	1							1	CCO-696D	NW-1	1.3X4M	340-410	-	2nd soil			
95-8	1221	A	67.1	54.1	43.1	163.2	Core	Chert		1			1			1	CCO-696D	SW-1	1.6X4M	340-410	-	2nd soil			
95-8	1223		60.9	60.7	47.9	223	Core	Dacite	1				1		Spilt Cobble	1	CCO-696D	SW-1	1.6X4M	340-410	-	2nd soil			
95-8	1225		56.7	50.3	31.8	86.8	Core	Siltstone	1							1	CCO-696D	SE-1	1.6X4M	340-410	-	2nd soil			
95-8	1228		58.7	52	29.8	86.1	Core	Chert	1							1	CCO-696D	-	-	-	-	2nd soil			
95-8	1231		55.6	47.2	43.7	148.6	Core	Siltstone		1						1	CCO-696D	-	-		-	2nd soil			
95-8	1245		132.2	98.3	99.7	900	Core	Quartzite	1							1	CCO-696D	W-1	1X4M	373-373	-	2nd soil			BD"A"
95-8	1256		39.3	33.6	25.6	38	Core	Siltstone	1							1	CCO-696D	E-1	1X4M	340-410		2nd soil			
95-8	1258		51.8	43.6	31.1	77.9	Core	Siltstone	1							1	CCO-696D	E-1	1X4M	340-410		2nd soil			
95-8	1269		61.3	49.2	27.9	105.3	Core	Siltstone	1							1	CCO-696W	TR5-2-9	-	090-110	-				BS
95-8	1302		54.2	49.4	35.2	76.7	Core	Dacite	1				1			1	CCO-696D	TR7-27-1	-	327-327	-	2nd soil			BD"A"
95-8	1303		38.5	38.3	28.8	35.3	Core	Chert		1						1	CCO-696D	TR7-27-1	-	350-400		2nd soil			BD"A"
95-8	1319		41.5	35.9	26.5	50.9	Core	Chert		1						1	CCO-696D	EX5TR	-	325-350		2nd soil			
95-8	1323		56.5	32.8	22.8	44.8	Core	Siltstone	1							1	CCO-696D	EX5TR	-	325-350	-	2nd soil			
95-8	1379		171	141.8	68	1570	Core	Siltstone	1							1	CCO-696W	EXP-5	-	096-096	-	S35W	42.0M		D-M2
95-8	1426		94.9	84.7	57.6	406.9	Core	Chert		1						1	CCO-696W	BK-2/3	-	094-094	-	S89E	38.0M		D-M2
95-8	1451		53.3	36.3	32.2	56.1	Core	Quartzite	1							1	CCO-696W	M5S	.5MX.5M	030-040	1/8"				
95-8	1734		73.7	68.4	61.6	277.8	Core	Siltstone		1			1			1	CCO-696W	BK-2/3	-		-				
95-8	1746		150.9	111.6	53.7	1120	Core	Siltstone	1				1			1	CCO-696W	BK-1/2	-		-				
95-8	1751		90.1	47.8	40.2	175.1	Core	Siltstone	1				1			1	CCO-696W	BK-1/2	Central		-				
95-8	1784		90.3	68.9	51.9	385.8	Core	Quartzite	1				1		Spilt Cobble	1	CCO-696W	EX1	-	060-100	-				
95-8	1808		66.1	45.6	38.1	162.4	Core	Chert	1						End Battered	1	CCO-696W	EX2	-		-				
95-8	1820		64.8	62.2	41.9	224.3	Core	Chert		1						1	CCO-696W	EX2	-		-				
95-8	1839		35.2	32.1	24	23.4	Core	Chert		1						1	CCO-696W	EX2	-	060-070	-				
95-8	1845		77.9	61.6	41.7	212	Core	Chert		1			1			1	CCO-696W	EX2	-	000-070	-				
95-8	1846		41.2	33.6	18.9	30.4	Core	Chert		1						1	CCO-696W	EX2	-	060-060	-				
95-8	1847		52.2	45.8	37.1	59.3	Core	Chert		1			1			1	CCO-696W	EX2	-	060-060	-				
95-8	1856		128.5	84.9	70.4	756	Core	Chert	1							1	CCO-696W	EX2	-	075-120	-				
95-8	1859		57.4	55.4	41.4	140.8	Core	Siltstone		1						1	CCO-696W	EX2	-	075-120	-				
95-8	1888		70.1	62.7	39.5	164.9	Core	Siltstone	1							1	CCO-696W	EX5	-		-				
95-8	1916		88.8	83.3	69.6	537.7	Core	Siltstone		1						1	CCO-696W	EXP-6	-	060-080	-				BS
95-8	1924		84.5	45.8	36	157.7	Core	Quartz	1				1			1	CCO-696W	SPOILS	-		-				
95-8	2058		69.2	59.1	43.6	208.8	Core	Siltstone	1							1	CCO-696D	2nd soil							
95-8	2059		78.8	60.8	33.6	157.9	Core	Siltstone	1							1	CCO-696D	2nd soil							
95-8	2064		56.6	50.1	41.1	122.5	Core	Siltstone	1							1	CCO-696N	1st soil							
95-8	2076		60	46.1	30.3	94.1	Core	Chert	1				1			1	CCO-696N	1st soil							
95-8	2096		58.3	50.6	38.2	102.9	Core	Chert	1				1			1	CCO-696D	2nd soil							
95-8	2097		56.9	50.1	30.2	115.9	Core	Chert	1				1			1	CCO-696D	2nd soil							

Cores Tools 1 of 1

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Form	Material	Unidir.	Multidir.	Crshd	Plshd	Cbl Ctx	Backed	Remarks	Count	Site	Unit	Unit size	Depth	Mesh	Context	Dist.	Feature	Datum
95-2	2532		90.5	66.3	55.2	390.8	Core Tl.	Quartzite		1	1					1	CCO-458W	N125/W105	1MX2M	000-010					
95-2	2811		42.8	40.2	23.4	46	Core Tl.	Quartzite		1	1		1		Fragment	1	CCO-458W	N126/W106	1MX2M	010-030	1/4"				
95-7	315		50.8	34.4	28.4	50.5	Core Tl.	Petrified Wood	1		1		1			1	CCO-637	S26/W1	-	060-080	1/4"				
95-7	393		63.9	48.4	46.4	195.5	Core Tl.	Quartzite	1		1		1			1	CCO-637	TR4-27-1	-		-	SPOILS			
95-8	266		96.6	74.9	58.8	368.8	Core Tl.	Siltstone		1	1					1	CCO-696W	-				EXPMTX		B-18	
95-8	464		80.6	70	47.4	338.7	Core Tl.	Siltstone	1		1					1	CCO-696W					EXPMTX		B-153	
95-8	467		70.4	50	26.3	101.3	Core Tl.	Siltstone	1		1					1	CCO-696W					EXPMTX		B-153	
95-8	638		53.2	41.5	29.9	68.3	Core Tl.	Chert	1		1		1			1	CCO-696W	-	-		-			F-17	
95-8	798		85.9	57	45.6	232.4	Core Tl.	Siltstone		1	1			1		1	CCO-696W	N0/W2	2MX2M	090-100	1/4"				
95-8	1201		92.3	71.4	43.5	304.8	Core Tl.	Dacite	1		1		1			1	CCO-696D	NW-1	1.3X4M	340-390	-	2nd soil			
95-8	1235		47.9	47.5	41.2	108.7	Core Tl.	Siltstone	1		1					1	CCO-696D	NE-1	1.3X4M	340-410	-	2nd soil			
95-8	1236		75.2	55	38	188.4	Core Tl.	Chert	1		1		1			1	CCO-696D	NE-1	1.3X4M	340-410	-	2nd soil			
95-8	1893		68.7	55.4	56.1	217.5	Core Tl.	Dacite		1	1		1	1		1	CCO-696W	EX5	-	100-100	-				

Bipolar Cores 1 of 1

ACC#	CAT #	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Form	Remarks	Count	Material	Source I.D.	Source	Site	Unit	Unit Size	Depth	Mesh	Context	Feature
95-2	4	14	11.6	4.3	0.7	Core	Bipolar Core	1	Obsidian	V	NV	CCO-458W	N120/W106	1MX2M	000-010	1/4"		
95-2	759	18.9	10	6.6	1.2	Core	Bipolar Core	1	Obsidian	V	NV	CCO-458W	N122/W107	1MX2M	000-010	1/4"		
95-2	998	22.1	19.2	5.8	1.1	Core	Bipolar Core	1	Obsidian	V	NV	CCO-458W	N122/W104	1MX2M	010-020	1/4"		
95-2	1018	23.4	12.2	8.6	2.4	Core	Bipolar Core	1	Obsidian	V	NV	CCO-458W	N124/W105	1MX2M	010-020	1/4"		
95-2	1034	20	14.9	7	1.6	Core	Bipolar Core	1	Obsidian	V	NV	CCO-458W	N124/W105	1MX2M	020-030	1/4"		
95-2	1041	21.7	12.4	5	1.1	Core	Bipolar Core, Cortex	1	Obsidian	V	NV	CCO-458W	N124/W105	1MX2M	020-030	1/4"		
95-2	1189	20	10.2	8.3	1.2	Core	Bipolar Core	1	Obsidian	V	NV	CCO-458W	N124/W105	1MX2M	120-130	1/4"		
95-2	1320	17.8	13	9.7	1.9	Core	Bipolar Core	1	Obsidian	V	NV	CCO-458W	N124/W109	1MX2M	040-050	1/4"		
95-2	1411	20.4	16.3	9.1	2.2	Core	Bipolar Core	1	Obsidian	V	NV	CCO-458W	N126/W103	1MX2M	030-040	1/4"		
95-2	1649	20.7	15.3	9.6	2.5	Core	Bipolar Core, Cortex	1	Obsidian	V	NV	CCO-458W	N126/W108	1MX2M	000-010	1/4"		
95-2	1668	24.8	16.9	12.2	3.9	Core	Bipolar Core, Cortex	1	Obsidian	V	NV	CCO-458W	N126/W108	1MX2M	010-020	1/4"		
95-2	2234	22.8	11.1	6.7	1.5	Core	Bipolar Core	1	Obsidian	V	NV	CCO-458W	N126/W110	1MX2M	020-030	1/4"		
95-2	2282	15.9	13.7	7	1.4	Core	Bipolar, Biface	1	Obsidian	V	BH	CCO-458W	N126/W110	1MX2M	040-050	1/4"		
95-2	2311	29.7	14.6	8.8	2.6	Core	Bipolar Core, Spall	1	Obsidian	V	NV	CCO-458W	N126/W110	1MX2M	070-080	1/4"		
95-8	167	21.7	12.1	7.5	1.6	Core	Bipolar, Edge Modified	1	Obsidian	V	NV	CCO-696W	-	-	117-117	-	BURMTX	B-127

Cobble Tools 1 of 1

Acc #	Cat #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Form	Material	Unidir.	Multidir.	Crshd	Plshd	Cbl Ctx	Backed	Remarks	Count	Site	Unit	Unit size	Depth	Mesh	Context	Dist.	Feature	Datum
95-2	1711		69.3	65.9	50.3	317.3	Cbl Tool	Siltstone	1		1		1	1	Spilt Cobble	1	CCO-458W	N126/W108	1MX2M	030-040	1/4"				
95-3	148		90.7	82.9	28.2	242.5	Cbl Tool	Sandstone	1		1		1			1	CCO-459	-	-		-				
95-6	45		90.3	77.9	73.6	532	Cbl Tool	Gabbro		1	1		1	1	Spilt Cobble	1	CCO-636	S20/W0	1MX1M	000-020	1/4"				
95-7	255		103.8	94.9	56.3	560.6	Cbl Tool	Quartzite	1		1		1		Spilt Cobble	1	CCO-637	S33/W3	1MX2M	090-100	1/4"				
95-8	337		71.7	85.5	54.9	457.5	Cbl Tool	Quartzite	1		1		1	1	Spilt Cobble	1	CCO-696S	-				EXPMTX		B-53	
95-8	354		117.4	100.1	76.7	4890	Cbl Tool	Quartzite	1		1		1	1	Spilt Cobble	1	CCO-696S	-				BURMTX		B-68	
95-8	565		88.3	75.3	51.6	448.5	Cbl Tool	Quartzite	1		1	1	1		Spilt Cobble	1	CCO-696S	-				EXPMTX		B-3	
95-8	668		58.2	49.6	31	104	Cbl Tool	Chert	1		1		1		Spilt Cobble	1	CCO-696S	S2.5/E22	2MX2M	090-100	1/4"				
95-8	1033		83.2	72.5	61.7	565	Cbl Tool	Quartzite	1		1		1	1	Spilt Cobble	1	CCO-696S	S2.5/E25	2MX2M	110-120	1/4"				
95-8	1728		86.7	71.2	45.8	390.8	Cbl Tool	Graywacke		1	1		1	1	Reworked Pestle	1	CCO-696S	BK-1/5	-	090-090	-				BS
95-8	1773		65.1	50.7	41	134	Cbl Tool	Siltstone	1		1		1	1	Spilt Cobble	1	CCO-696S	EX1	-	060-100	-				
95-8	1806		69	58.2	45.7	194.6	Cbl Tool	Dacite		1	1		1		Spilt Cobble	1	CCO-696S	EX2	-		-				
95-8	1849		69.4	61.4	46	235.2	Cbl Tool	Quartzite	1		1		1		End Battered	1	CCO-696S	EX2	-	060-060	-				
95-8	1850		81.5	64.6	58.5	356.2	Cbl Tool	Chert	1		1		1	1	Spilt Cobble	1	CCO-696S	EX2	-	060-060	-				
95-8	1876		82.3	61.1	44.9	199.8	Cbl Tool	Chert		1	1		1		Spilt Cobble	1	CCO-696S	EX4	-		-				
95-8	1885		76.2	62.5	52.9	290.7	Cbl Tool	Chert		1	1		1		Spilt Cobble	1	CCO-696S	EX5	-		-				

Battered Cobbles 1 of 1

ACC #	CAT #	Sub	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Form	End Wrkd	Side Wrkd	Material	Site	Count	Unit	Unit Size	Depth	Messh	Context	Area	Feature	Datum	Remarks
95-8	1373		108.4	86.6	49.5	840	Bat. Cob	1		Andesite	CCO-696W	1	EXP-4	-	095-095	-	S2E	21.3M		BD-A	
95-7	281		75.4	65.4	46.9	319.3	Bat. Cob	1		Basalt	CCO-637	1	S33/W3	1MX2M	120-130	1/4"					
95-8	304		77	57.1	50.2	235.9	Bat. Cob	1		Chert	CCO-696W	1	-				EXPMTX		B-30		
95-8	469		86.8	71.2	65.3	535.6	Bat. Cob	1		Chert	CCO-696W	1					EXPMTX		B-153		
95-8	1419		83.3	70	63.1	426.9	Bat. Cob	1	1	Chert	CCO-696W	1	BK-1/5	-	098-098	-	S25W	34.4M		D-M3	
95-8	1821		87.2	71	65.3	616	Bat. Cob	1	1	Chert	CCO-696W	1	EX2	-		-					
95-8	1857		83.9	67.7	59.8	431.7	Bat. Cob	1		Chert	CCO-696W	1	EX2	-	075-120	-					
95-7	7		104.9	93.1	65.1	948.5	Bat. Cob	1		Chert	CCO-637	1	S50/W0	1.4MX1.7M	070-085	1/4"					
95-8	1903		69.8	64.2	49.4	329.2	Bat. Cob	1	1	Chert	CCO-696W	1	EXP-5	-	060-100						
95-8	1884		73.9	69	66.9	338.2	Bat. Cob	1	1	Chert	CCO-696W	1	EX5	-		-					
95-8	1752		128.2	92.8	67.6	1290	Bat. Cob	1		Dacite	CCO-696W	1	BK-1/2	CENTRAL		-					
95-8	1904		83.4	82.9	53.4	501.7	Bat. Cob	1		Dacite	CCO-696W	1	EXP-5	-	060-100	-					
95-8	468		58.8	66.1	47.9	222.2	Bat. Cob	1		Dacite	CCO-696W	1	-	-		-	EXPMTX		B-153		
95-8	1848		113.8	76.7	67.7	784	Bat. Cob	1		Dacite	CCO-696W	1	EX2	-	060-060	-					
95-12	10		120.9	107.4	64.6	992	Bat. Cob	1	1	Gabbro	OFF SITE	1	KEY PROF #5	-	240	-					
95-8	1410		122.2	95.8	60.2	1200	Bat. Cob	1		Granite	CCO-696W	1	EXP-3	-	078-078	-	S32E	15.4M		BD-A	
95-8	1727		71.6	66.8	61.1	404.5	Bat. Cob	1		Quartz	CCO-696W	1	BK-1/5	-	065-065	-				BS	Profile Artifact #4
95-8	1332		86.1	81	53.4	490.2	Bat. Cob	1		Quartz	CCO-696W	1	EXP-1	-	099-099	-	S34W	12.1		BD-A	
95-8	1879		88.5	85.6	62.5	700	Bat. Cob	1		Quartz	CCO-696W	1	EX4	-		-					
95-18	3		72.3	59	33.2	193.3	Bat. Cob	1		Quartzite	CCO-631	1		SPOILS	SURFACE		PEAT				
95-18	6		100.9	58	54.4	477.8	Bat. Cob	1		Quartzite	CCO-631	1		SPOILS	SURFACE		CALCAREOUS				
95-8	1877		67.6	53.8	48.8	237.2	Bat. Cob	1		Quartzite	CCO-696W	1	EX4	-		-					
95-8	1955		105.4	84.3	72.1	900	Bat. Cob	1		Quartzite	CCO-696E	1	S2.5/E25	2MX2M	150-160	1/4"					
95-8	1252		118.8	74.8	51.3	750	Bat. Cob	1		Quartzite	CCO-696D	1	W-1	1X4M			DEEP				
95-8	1240		71	61.2	40.4	241.5	Bat. Cob	1		Quartzite	CCO-696D	1	NE-1	1.3X4M		-	DEEP				
95-8	2090		85.6	82	42.7	532	Bat. Cob	1	1	Schist	CCO-696N	1									
95-7	204		55.8	50.6	45.7	188.4	Bat. Cob	1		Siltstone	CCO-637	1	S31/W3	1MX2M	090-100	1/4"					Feature 3, Artifact A
95-8	1257		51.5	48.7	44.3	157.1	Bat. Cob	1		Siltstone	CCO-696D	1	E-1	1X4M		-	DEEP				
95-8	1371		60.9	54.7	53	255.3	Bat. Cob	1		Siltstone	CCO-696W	1	EXP-4	-	123-123	-	N60E	37.6M		BD-M2	
95-8	1858		67.1	58.6	55.3	278.2	Bat. Cob	1		Siltstone	CCO-696W	1	EX2	-	075-120	-					
95-8	388		85.2	83	74.8	750	Bat. Cob	1		Siltstone	CCO-696W	1	-				EXPMTX		B-109		

Pitted Cobbles 1 of 1

ACC #	CAT #	Site	Condition	Shape	Form	Material	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Shape Cncvty	Provenience	Depth	Context	Feature	Remarks
95-8	328	CCO-696W	Fragment	Cobble	Unifacial Pitted Cobble	Sandstone	92	76.2	52	432.1	Irregular		106	EXPMTX	BUR 48	
95-8	411	CCO-696W	Complete	Cobble	Unifacial Pitted Cobble	Sandstone	71.9	63.2	39.4	201.3	Conical		111	BURMTX	BUR 116	
95-8	799	CCO-696W	Complete	Cobble	Unifacial Pitted Cobble	Sandstone	143.8	107.2	72	1288	Irregular	N0/W2	90-100			
95-8	968	CCO-696W	Complete	Cobble	Unifacial Pitted Cobble	Sandstone	81	71.6	39.7	294.4	Irregular	N0/W6	90-100			End Battered
95-8	1403	CCO-696W	Complete	Cobble	Unifacial Pitted Cobble	Sandstone	86.8	81.7	60.4	672	Circular	22.7M@S13W A	63			
95-8	1413	CCO-696W	Fragment	Cobble	Unifacial Pitted Cobble	Sandstone	162.1	105.4	55.6	1510	Irregular	35M@S10W M3	103			
95-8	1420	CCO-696W	Fragment	Cobble	Unifacial Pitted Cobble	Sandstone	101.1	49.8	60.4	292.4	Indet.	34.4M@S25W M3	98			
95-8	1789	CCO-696W	Complete	Cobble	Unifacial Pitted Cobble	Sandstone	64.9	59.7	37.3	162.3	Irregular	EXP 1				
95-8	1796	CCO-696W	Complete	Cobble	Bifacial Pitted Cobble	Sandstone	76.1	69.9	32.8	204.4	Conical	EXP 2				
95-8	1889	CCO-696W	Complete	Cobble	Bifacial Pitted Cobble	Sandstone	103	103.1	26.7	169.3	Irregular	EXP 5	60-90			

ACC #	CAT #	Site	Condition	Arc 1 (degrees)	Arc 2 (degrees)	Shape	Material	Weight (grams)	Length (mm)	Mid Width (mm)	Provenience	Feature	Depth (cm)
95-18	12	CCO-631	Complete	25.4	25.4	Cobble	Quartzite	1217.6	161	67	Spoils		
95-18	4	CCO-631	Complete	22.6	-	Cobble	Quartzite	622.4	136	69.5	Spoils		
95-18	11	CCO-631	Complete	50.8	38	Cylindrical	Quartzite	1811.3	225	79.2	Spoils		
95-18	9	CCO-631	Complete	32.4	63.2	Cylindrical	Andesite	1955.5	210	80.5	Spoils		
95-18	10	CCO-631	Complete	90.4	76	Cylindrical	Andesite	1360	163	65	Spoils		
95-18	7	CCO-631	End	38	N/A	Indet.	Unknown	312.5	77	56	Spoils		
95-12	44	OFFSITE	Complete	45.7	-	Cobble	Unknown	2404	275	85.2	Isolate		270
95-2	2604	CCO-458W	Complete	127	127	Cylindrical	Sandstone	582	143	49			Surface
95-2	2576	CCO-458W	Midesection	N/A	N/A	Cylindrical	Sandstone	713	127	56.8	SA-11		Surface
95-2	721	CCO-458W	End	32.4	N/A	Indet.	Sandstone	718.6	130	78	N122/W110		40-50
95-2	2574	CCO-458W	End Spall	N/A	N/A	Indet.	Sandstone	58.6			SA-55		Surface
95-2	2583	CCO-458W	End Spall	N/A	N/A	Indet.	Sandstone	75.2			-		Surface
95-2	2695	CCO-458E	End Spall	N/A	N/A	Indet.	Greywacke	135.5			N196/E20		050-060
95-2	1279	CCO-458W	End Spall	N/A	N/A	Indet.	Sandstone	49.6			N124/W109		020-030
95-2	2198	CCO-458W	End Spall	N/A	N/A	Indet.	Sandstone	83.2			SA-42		Surface
95-2	854	CCO-458W	Margin	N/A	N/A	Indet.	Sandstone	218.3			N126/W106		010-020
95-2	475	CCO-458W	Margin	N/A	N/A	Indet.	Sandstone	14.6			N122/W108		040-050
95-2	380	CCO-458W	Margin	N/A	N/A	Indet.	Sandstone	70.9			N120/W105		020-030
95-2	1929	CCO-458W	Margin	N/A	N/A	Indet.	Sandstone	22.8			N126/W104		010-020
95-2	520	CCO-458W	Margin	N/A	N/A	Indet.	Sandstone	50.9			N120/W107		010-020
95-2	2579	CCO-458W	Margin	N/A	N/A	Indet.	Sandstone	122.7			-		Surface
95-3	31	CCO-459	End Spall	N/A	N/A	Indet.	Sandstone	45.7			N1.5/E5		10-20
95-6	47	CCO-636	End	45.7	N/A	Cylindrical	Sandstone	603	83	65.5	Isolate		Surface
95-7	363	CCO-637	Complete	50.8	127	Cobble	Sandstone	1900	220	79.3	Kellogg Crk.		Surface
95-7	416	CCO-637	Complete	20	-	Cobble	Sandstone	3220	300	117.2	18M@N67W M4		25 BD
95-7	417	CCO-637	End	25.4	N/A	Cobble	Sandstone	784	135	72.6	Spoils		
95-7	424	CCO-637	Complete	127	12.5	Conical	Greywacke	393.5	126.1	42.8	BUR 5		52 BDA
95-7	198	CCO-637	Complete	22.6	22.6	Cylindrical	Sandstone	1186.9	209	64.9	S31/W3		80-90
95-7	394	CCO-637	Complete	50.8	101.5	Cylindrical	Sandstone	1036	172	54.4	22@S71W M3	Feat. 7	84 BD
95-7	364	CCO-637	End	20	N/A	Cylindrical	Greywacke	1200	170	71.8	T4-25-6		150 BS
95-7	310	CCO-637	Midesection	N/A	N/A	Cylindrical	Sandstone	219	62	46.4	S26/W1		60-80 BS
95-7	300	CCO-637	End Spall	N/A	N/A	Indet.	Sandstone	75.4			Spoils		Surface
95-7	249	CCO-637	Margin	N/A	N/A	Indet.	Greywacke	249			S33/W3		80-90
95-7	365	CCO-637	Complete	12.5	-	Sl Shaped	Sandstone	2550	282	72.2	S27/W3		110-120
95-7	420	CCO-637	Complete	127	48.9	Sl Shaped	Sandstone	800	144	62.6	Spoils		
95-7	426	CC0-637	End	50.8	-	Sl Shaped	Greywacke	696	128.3	61.8	Spoils		
95-8	1385	CCO-696W	Complete	45.7	Indet.	Cobble	Greywacke	3050	279	95.1	61.5M@S28W M3	Feat. 24	58 BDA
95-8	1755	CCO-696W	Complete	15	32.4	Cobble	Sandstone	463.8	135	54.8	40M@N85E M2		60 BDA
95-8	1906	CCO-696W	Complete	63.2	48.9	Cobble	Greywacke	1150	162	70.1	EXP 5 SW		60-100 BS
95-8	1759	CCO-696E	Complete	48.9	127	Cobble	Sandstone	1340	164	70.3	60M@N80E M2		107 BDA
95-8	1382	CCO-696W	Complete	30.5	-	Cobble	Greywacke	3470	266	118.9	61.4M@S23W M3		62 BDA
95-8	1414	CCO-696W	Complete	22.6	22.6	Cobble	Greywacke	1290	220	68.2	34M@S11W M3		86 BDA
95-8	1407	CCO-696W	Complete	30.5	-	Cobble	Sandstone	1620	198	70.8	12.9M@S25E A		64 BDA
95-8	1408	CCO-696W	Complete	25.4	60.8	Cobble	Sandstone	1370	195	70.8	15.3M@S31E A		85 BDA
95-8	382	CCO-696W	Complete	63.2	-	Cobble	Greywacke		220	95.2	BUR 100		
95-8	1409	CCO-696W	Complete	38	Indet.	Cobble	Sandstone	1740	231	79.5	13.8M@S48E		78 BDA
95-8	1380	CCO-696W	Complete	38	-	Cobble	Sandstone	2380	261	85.3	34.5M@N69W M3		68 BDA
95-8	1757	CCO-696W	Complete	25.4	127	Cobble	Sandstone	1040	163	61.9	58M@N180E M2		64 ADA
95-8	694	CCO-696E	End	20	N/A	Cobble	Greywacke	397.6	92	63.5	S2.5/E22		120-130
95-8	1756	CCO-696E	End	38	N/A	Cobble	Sandstone	1790	186	110.2	62.M@N78E M2		115 BDA
95-8	9	CCO-696W	Complete	32.4	60.8	Conical	Sandstone	3150	486	56.7	BUR 27		-
95-8	1758	CCO-696W	Complete	32.4	Indet.	Conical	Greywacke	896	192	53.1	60M@S45W M2		07 BD
95-8	109	CCO-696W	Complete	30.5	55.2	Conical	Sandstone	2016	358	63	BUR 76		-
95-8	1790	CCO-696W	Complete	35.5	127	Conical	Sandstone		125	60.2	EXP 1 SE 1/4		0-60 BS
95-8	1406	CCO-696W	End	17.5	N/A	Conical	Sandstone	672	135	56.5	8.1M@S29E A	Feat. 23	72.5 BDA
95-8	629	CCO-696W	Complete	25.4	127	Cylindrical	Sandstone	1704	192	76.8	18.5M@N196E M3	Feat. 14	126 BDA
95-8	2066	CCO-696N	Complete	58.4	Indet.	Cylindrical	Sandstone	952	149	67.7	96M@N75E		387 BDM4
95-8	2068	CCO-696N	Complete	35.5	40.5	Cylindrical	Sandstone	3780	310	83.5	80M@N74E		461 BDM4
95-8	1386	CCO-696W	Complete	50.8	-	Cylindrical	Sandstone	5400	318	98.2	61.5M@S28W M3	Feat. 24	58 BDA
95-8	1357	CCO-696W	End	76	N/A	Cylindrical	Sandstone	246.1	91	64.6	34.4M@S25W M3		98 BDA
95-8	2099	CCO-696N	Midesection	-	-	Cylindrical	Sandstone	1048.1	124.8	71.5		BUR 157	126 BDA
95-8	1915	CCO-696W	End	48.9	N/A	Indet.	Sandstone	408.3	92	63.4	EXP 6N		60-80 BS
95-8	1815	CCO-696W	End	22.6	N/A	Indet.	Sandstone	125.1	64	41.9	EXP 2		
95-8	1827	CCO-696W	End	45.7	N/A	Indet.	Sandstone	788.2	75, 81	69.1	EXP 2C		60-80 BS
95-8	1048	CCO-696E	End	32.4	N/A	Indet.	Greywacke	405	90	69.5	S2.5/E25		130-140
95-8	1427	CCO-696W	End	38	N/A	Indet.	Sandstone	784	141	74.6	24M@S3E M3		70 BDA
95-8	2065	CCO-696W	End	43.1	N/A	Indet.	Sandstone	286.5	65	60	82M@S86E M4		353 BD M4
95-8	648	CCO-696W	End	43.1	N/A	Indet.	Sandstone	218.3	84	65.7	50M@S22W M3	Feat. 22	
95-8	2061	CCO-696W	Midesection	N/A	N/A	Indet.	Sandstone	285.6	49	65.7	Buried A		
95-8	2062	CCO-696W	Midesection	N/A	N/A	Indet.	Sandstone	349.5	80	58.4	Buried A		
95-8	2063	CCO-696N	Complete	48.9	76	Sl Shaped	Sandstone	896	125	67.5	Buried A		
95-8	1400	CCO-696W	Complete	127	63.2	Sl Shaped	Sandstone	1680	182	84.3	21.5M@S20W		30 BDA
95-8	1739	CCO-696W	Complete	30.5	66.7	Sl Shaped	Sandstone	1040	145	72.1	BALK 5/7 SOUTH		
95-8	2060	CCO-696N	End	53.2	N/A	Sl Shaped	Greywacke	532	105	63.8	Isolate		

Mortars 1 of 1

Acc #	Cat #	Site	Cond.	Shape	Form	Material	Weight (grams)	Height (mm)	Length (mm)	Width (mm)	Dpth Cncvty (mm)	Wdth Cncvty (mm)	Lgth Cncvty (mm)	Rim Thick (mm)	Cncvty Arc (degrees)	Provenience	Depth (cm)	Feature
95-11	M5	CCO-468	Complete	Cobble	Block Sm.	Sandstone	N/A	N/A	370	310	18	110				S2/W2	Surface	
95-11	M6	CCO-468	Complete	Cobble	Block Sm.	Sandstone	N/A	N/A	450	250	23	110				N0/W1	Surface	
95-18	1	CCO-631	Fragment	Shaped	Bowl Lg.	Unknown	1334	120						63.1		SPOILS	PEAT	
95-2	2607	CCO-458W	Complete	Cobble	Block Sm.	Sandstone		160	635	350	44.4	120			38	N126/W104	48 BS	
95-2	2746	CCO-458E	Fragment	Cobble	Bowl Lg.	Sandstone	1363	134						39.2		N200/E20	40-50	
95-3	174	CCO-459	Complete	Cobble	Block Unq.	Sandstone	31050	132.5	670	345	22.3	110	152		35.8	S1/W0	30-40	
95-6	65	CCO-636	Complete	Cobble	Block Sm.	Sandstone	36000	185	550	270	35	120	125			Fenceline	Surface	
95-6	66	CCO-636	Complete	Cobble	Block Sm.	Sandstone	24750	170	355	295	35	105	110			Fenceline	Surface	
95-6	67	CCO-636	Complete	Cobble	Block Sm.	Sandstone	14400	150	395	270	12.5	90	100			Fenceline	Surface	
95-6	68	CCO-636	Complete	Cobble	Block Sm.	Sandstone	20700	110	550	335	60	125				Fenceline	Surface	
95-7	311	CCO-637	Fragment	Indet.	Indet.	Sandstone	378.5									S26/W1	60-80 BS	
95-7	421	CCO-637	Cond. Comp	Cobble	Block Unq.	Sandstone	29568	160	450	360	42	205			127	19.1M@N63W M4	29 BDM4	
95-7	425	CCO-637	Fragment	Indet.	Bowl Lg.	Sandstone	288.3									Backdirt		
95-8	8	CCO-696W	Complete	Shaped	Bowl Lg.	Sandstone	35550	260	360	360	190	300		31	127	BUR 27	EXP 2	BUR 27
95-8	89	CCO-696W	Cond. Comp	Shaped	Bowl Lg.	Sandstone	23750	205	360	360	190	300		33.5	101.5	BUR 57	EXP 2	BUR 57
95-8	553	CCO-696W	Fragment	Indet.	Indet.	Sandstone	313.5									BUR 1	BUR MTX	
95-8	631	CCO-696W	Fragment	Indet.	Bowl Lg.	Sandstone	760	72						35		FEAT. 15		FEAT. 15
95-8	647	CCO-696W	Fragment	Cobble	Indet.	Sandstone	7650	110	255	254						34.8S@S30W M3	113 BDA	FEAT. 21
95-8	650	CCO-696W	Cond. Comp	Sl. Shaped	Block Unq.	Sandstone	13050	145	300	255	34.5	160	255		96.4	18.5M@N196E M3	126 BDA	FEAT. 14
95-8	808	CCO-696W	Fragment	Indet.	Bowl Lg.	Andesite	307.5							29.1		N0/W2	100-110 BDA	
95-8	1364	CCO-696W	Cond. Comp	Cobble	Block Lg.	Sandstone	20250	160	420	360	85.3	172			25.4	1.4M@N50E A	104 BDA	
95-8	1365	CCO-696W	Cond. Comp	Cobble	Block Sm.	Sandstone	18450	230	285	240	61	135			35.5	36M@S87E A	150 BDA	
95-8	1368	CCO-696W	Fragment	Cobble	Block Lg.	Sandstone	41805	300	460	300	85	160			30.5	15.7M@S40E A	75 BDA	
95-8	1375	CCO-696W	Fragment	Cobble	Indet.	Sandstone	3190					35				22M@N195E M3	123 BDA	
95-8	1376	CCO-696E	Fragment	Cobble	Bowl Lg.	Sandstone	3280	138						44.8		30M@N79E A	128 BDA	
95-8	1377	CCO-696W	Fragment	Cobble	Bowl Lg.	Sandstone		400	520	250	160	260				60.8M@S27W M3	58 BDA	FEAT. 24
95-8	1383	CCO-696W	Fragment	Indet.	Bowl Sm.	Sandstone	1290	108						29.9		52M@S27W M3	19 BDA	
95-8	1387	CCO-696W	Cond. Comp	Cobble	Bowl Sm.	Sandstone	4170	113		191	29	102		36.9	63.2	14.5M@S85W A	71.5 BDA	
95-8	1399	CCO-696E	Cond. Comp	Cobble	Bowl Sm.	Sandstone	2800	100		180	35.8	75		44.3	20	31M@S31E M3	126 BDA	
95-8	1405	CCO-696W	Cond. Comp	Shaped	Bowl Sm.	Unknown	3000	101		172	70	132		23.5	60.8	8.1M@S29E A	72.5BDA	FEAT. 23
95-8	1678	CCO-696W	Fragment	Indet.	Indet.	Sandstone	57.6									M25S	30-40	
95-8	1754	CCO-696W	Complete	Cobble	Block Sm.	Sandstone	10130	170	265	215	26.7	110			50.8	37.1M@N61E M2	123 BDA	
95-8	1760	CCO-696W	Cond. Comp	Cobble	Bowl Sm.	Micaceous Sndstn	3140	98		185	64.6	103		27.8	12.5	35.6M@S26W M3	132 BDA	
95-8	1837	CCO-696W	Fragment	Indet.	Bowl Lg.	Sandstone	1090	115						29.2		EXP 2 N1/3	60-70 BS	
95-8	2067	CCO-696N	Cond. Comp	Shaped	Bowl Sm.	Sandstone	812	93		131	47	97		22.7	38	80M@N73E M4	567 BD M4	
95-8	2071	CCO-696N	Complete	Cobble	Block Sm.	Sandstone	38080	205	550	350	24	110			76	96M@N75E M4	357 BDM4	
95-8	2072	CCO-696N	Complete	Cobble	Block Sm.	Sandstone	34944	155	470	334	41.1	115			43.1	92M@S86E M4	355 BDM4	
95-8	2073	CCO-696N	Complete	Cobble	Block Sm.	Sandstone	37632	190	530	340	9.7	85			58.1	100M@N76E M4	363 BDM4	
95-8	2088	CCO-696N	Complete	Cobble	Block Sm.	Sandstone	32256	115	412	382	39.5	115			50.8	696 NORTH		
95-8	2091	CCO-696N	Fragment	Sl. Shaped	Bowl Lg.	Sandstone	4650	140	250	250	131			31		Kellogg Creek		

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CAT#	SUB	SITE	LOCUS	PROV	DPTH	Species	Element	Old Type	New Type	FUN	CND	CNT	POLISH	BURN	COMMENTS
2685		458	EAST	N196/E20	40	MAMMAL.LARGE	LBF	UNID	UNID	UN	DST	1	MOD	3	striations
2773		458	EAST	N204/E20	60	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	1	
2442		458	NON	F1	90	MAMMAL.LARGE	UNID	UNID	UNID	UN	FRG	1	MOD	1	parallel striations
2539		458	WEST	N126/W103	10	MAMMAL.LARGE	FLAT	UNID	UNID	UN	MRG	1	MOD	1	
1376		458	WEST	N126/W103	20	MAMMAL.LARGE	LBF	BI-POINT	BI-POINTED	AP	MED	1	HIGH	1	
1419		458	WEST	N126/W103	40	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	MRG	1	MOD	1	stained
1422		458	WEST	N126/W103	40	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	
1359		458	WEST	N126/W103	10	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	MRG	1	MOD	3	rough groove at prx, asphaltum
2550		458	WEST	N126/W103	40	ARTIO	ANT	UNID	UNID	UN	FRG	1	MOD	1	
1377	A	458	WEST	N126/W103	20	MAMMAL.LARGE	FLAT	UNID	UNID	UN	MRG	1	MOD	1	perpendicular striations
1459		458	WEST	N126/W103	60	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	MED	1	MOD	0	
1375		458	WEST	N126/W103	20	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	MRG	1	MOD	1	
1377	C	458	WEST	N126/W103	20	MAMMAL.LARGE	UNID	UNID	UNID	UN	MRG	1	HIGH	1	no teeth, 3 incisions @ 1end, tube?
862	C	458	WEST	N126/W106	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	nice worked dst end
855		458	WEST	N126/W106	20	MAMMAL.LARGE	UNID	UNID	UNID	UN	MED	1	HIGH	2	
862	A	458	WEST	N126/W106	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	END	1	MOD	1	scored and snapped
862	B	458	WEST	N126/W106	20	MAMMAL.LARGE	UNID	UNID	UNID	UN	MED	1	MOD	1	poss asphaltum
889		458	WEST	N126/W106	30	ARTIO	ANT	UNID	UNID	UN	END	1	NON	1	from a bone splinter
901		458	WEST	N126/W106	40	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	NC	1	MOD	1	
1400		458	WEST	N126/W103	30	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	2	few incisions
1377	B	458	WEST	N126/W103	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	
2597		458	WEST	N126/W104	60	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	FP	DST	1	HIGH	0	
904		458	WEST	N126/W106	40	MAMMAL.LARGE	FLAT	STRIGIL	CURVED-T	PC	MRG	1	HIGH	1	
1482		458	WEST	N126/W104	70	MAMMAL.LARGE	LBF	UNID	UNID	UN	PRX	1	MOD	1	
268		458	WEST	N124/W107	40	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	
270		458	WEST	N124/W107	40	MAMMAL.LARGE	LBF	BI-POINT	BI-POINTED	AP	MED	1	HIGH	1	
235		458	WEST	N124/W107	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	HIGH	1	
1331		458	WEST	N124/W109	50	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	HIGH	1	
293		458	WEST	N124/W107	50	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	1	
1022		458	WEST	N124/W105	20	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	FRG	1	MOD	1	asphaltum?
1112		458	WEST	N124/W105	60	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	MOD	1	
1093	A	458	WEST	N124/W105	50	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	MOD	1	
1027	A	458	WEST	N124/W105	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	2	striations
1168		458	WEST	N124/W105	110	MAMMAL.LARGE	FLAT	STRIGIL	CURVED-T	PC	MED	1	MOD	1	
1170		458	WEST	N124/W105	110	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	MRG	1	HIGH	2	
1592		458	WEST	N125/W105	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	cross striations at margin
1282		458	WEST	N124/W109	30	ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	MOD	1	
1619		458	WEST	N125/W105	40	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	1	
1629		458	WEST	N125/W105	50	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	1	
1600		458	WEST	N125/W105	30	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	MOD	2	

CAT#	SUB	SITE	LOCUS	PROV	DPTH	Species	Element	Old Type	New Type	FUN	CND	CNT	POLISH	BURN	COMMENTS
1286		458	WEST	N124/W109	30	MAMMAL.LARGE	RIB	UNID	UNID	UN	FRG	1	HIGH	1	cross striations
1332		458	WEST	N124/W109	50	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	0	
1329		458	WEST	N124/W109	50	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	FP	DST	1	HIGH	1	
1330		458	WEST	N124/W109	50	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	1	
1328		458	WEST	N124/W109	50	MAMMAL.LARGE	FLAT	UNID	UNID	UN	MRG	1	HIGH	1	
1266		458	WEST	N124/W109	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	MOD	1	
903		458	WEST	N126/W106	40	MAMMAL.MEDIUM	FLAT	UNID	UNID	UN	MRG	1	MOD	2	poss asphaltum at prx end
2220	A	458	WEST	N126/W110	20	MAMMAL.MEDIUM	LBF	AWL	SINGLE-PO	FP	DST	1	MOD	0	striations and polish on cortex
1498	D	458	WEST	N126/W110	10	MAMMAL.LARGE	UNID	UNID	UNID	UN	MRG	1	MOD	1	from a bone chip
2220	B	458	WEST	N126/W110	20	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	MED	1	MOD	1	
1498	C	458	WEST	N126/W110	10	MAMMAL.LARGE	FLAT	UNID	UNID	UN	END	1	MOD	0	scored and snapped
2224		458	WEST	N126/W110	20	MAMMAL.LARGE	UNID	UNID	UNID	UN	MRG	1	HIGH	1	
1498	B	458	WEST	N126/W110	10	MAMMAL.LARGE	FLAT	UNID	UNID	UN	FRG	1	HIGH	1	scored and snapped
2277		458	WEST	N126/W110	50	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	FP	DST	1	MOD	0	striations
2201	A	458	WEST	N126/W110	10	MAMMAL.LARGE	FLAT	STRIGIL	CURVED-T	PC	MRG	1	MOD	1	poss asp., scored and snapped
2225		458	WEST	N126/W110	20	MAMMAL.MEDIUM	LBF	TUBE	TUBE	ORN	END	1	MOD	1	
2201	B	458	WEST	N126/W110	10	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	MRG	1	HIGH	1	
2304		458	WEST	N126/W110	70	BIRD	ULNA.D	UNID	UNID	UN	PRX	1	HIGH	1	asphaltum
2079	B	458	WEST	N130/W100	20	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	DST	1	MOD	1	
2079	D	458	WEST	N130/W100	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	2	
2079	C	458	WEST	N130/W100	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	1	striations
2133		458	WEST	N150/W90	20	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	MED	1	HIGH	1	striations
2121		458	WEST	N140/W110	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	1	
1498	A	458	WEST	N126/W110	10	MAMMAL.LARGE	FLAT	UNID	UNID	UN	FRG	1	HIGH	1	
2303		458	WEST	N126/W110	70	ELK	METAC.D	UNID	UNID	UN	PRX	1	MOD	3	
2365		458	WEST	N126/W110	110	MAMMAL.LARGE	LBF	BI-POINT	BI-POINTED	AP	END	1	MOD	0	
2079	A	458	WEST	N130/W100	20	ARTIO	METAP	UNID	UNID	UN	PRX	1	NON	2	
2378		458	WEST	N126/W110	120	MAMMAL.LARGE	UNID	UNID	UNID	UN	FRG	1	HIGH	1	
2249		458	WEST	N126/W110	30	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	MRG	1	MOD	1	
1751		458	WEST	N126/W108	60	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	FRG	1	MOD	1	
862	E	458	WEST	N126/W106	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	MOD	1	
1753		458	WEST	N126/W108	60	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	MRG	1	HIGH	1	aux. border of infrasp. fossa
1759		458	WEST	N126/W108	60	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	
1754		458	WEST	N126/W108	60	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	HIGH	1	stained
902		458	WEST	N126/W106	40	MAMMALIA	FLAT	UNID	UNID	UN	END	1	MOD	1	bone splinter
905		458	WEST	N126/W106	40	MAMMAL.SMALL	LBF	UNID	UNID	UN	MRG	1	HIGH	1	
887		458	WEST	N126/W106	30	MAMMAL.LARGE	LBF	TUBE	TUBE	ORN	END	1	MOD	0	
862	D	458	WEST	N126/W106	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	1	stained
930		458	WEST	N126/W106	50	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	HIGH	1	
1674		458	WEST	N126/W108	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	1	elongate

CAT#	SUB	SITE	LOCUS	PROV	DPTH	Species	Element	Old Type	New Type	FUN	CND	CNT	POLISH	BURN	COMMENTS
2265	B	458	WEST	N126/W110	40	MAMMAL.SMALL	LBF	TUBE	TUBE	ORN	END	1	HIGH	0	
1749		458	WEST	N126/W108	60	MAMMAL.LARGE	LBF	UNID	UNID	UN	DST	1	HIGH	1	concretions
2264		458	WEST	N126/W110	40	MAMMAL.LARGE	UNID	UNID	UNID	UN	MRG	1	MOD	1	striations
2319		458	WEST	N126/W110	80	MAMMAL.LARGE	RIB	UNID	UNID	UN	FRG	1	NON	1	
2265	A	458	WEST	N126/W110	40	MAMMAL.LARGE	FLAT	FLAT	UNID	UN	MRG	1	MOD	1	
1781		458	WEST	N126/W108	70	MAMMAL.LARGE	UNID	UNID	UNID	UN	FRG	1	HIGH	1	rodent gnawing
1752		458	WEST	N126/W108	60	MAMMALIA	UNID	BI-POINT	BI-POINTED	AP	MED	1	HIGH	1	
1758		458	WEST	N126/W108	60	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	2	elongate
1692		458	WEST	N126/W108	30	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	DST	1	HIGH	1	elongate
1712		458	WEST	N126/W108	40	ARTIO	METAP	AWL	SINGLE-PO	FP	WHL	1	HIGH	0	concretions
1128		458	WEST	N124/W105	70	MAMMAL.LARGE	FLAT	UNID	UNID	UN	FRG	1	MOD	1	
1543		458	WEST	N122/W104	40	MAMMAL.LARGE	UNID	UNID	UNID	UN	MRG	1	HIGH	0	asp. @ prx, perpen. & par. striations
1521		458	WEST	N122/W104	30	BIRD	ULNA	TUBE	TUBE	ORN	END	1	HIGH	1	perpendicular dst end
989	A	458	WEST	N122/W104	10	ARTIO	ANT	UNID	UNID	UN	MED	1	MOD	1	from the dst end
511		458	WEST	N120/W108	40	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	1	
2039		458	WEST	N120/W60	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	
2040		458	WEST	N120/W60	20	MAMMAL.LARGE	UNID	UNID	UNID	UN	MRG	1	MOD	1	nice, in three pieces
610		458	WEST	N122/W105	30	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	DST	1	MOD	0	concretions
167		458	WEST	N122/W106	20	MAMMAL.LARGE	FLAT	INCISED	UNID	UN	FRG	1	NON	2	poss immature, concretions
165		458	WEST	N122/W106	20	MAMMAL.MEDIUM	LBF	BEAD	BEAD	ORN	WHL	1	NON	0	
989	B	458	WEST	N122/W104	10	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	FRG	1	MOD	1	
988		458	WEST	N122/W104	10	MAMMAL.MEDIUM	LBF	AWL	SINGLE-PO	FP	DST	1	HIGH	1	
626		458	WEST	N122/W105	40	ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	NON	2	stained
379		458	WEST	N120/W105	30	MAMMAL.LARGE	UNID	AWL	SINGLE-PO	FP	DST	1	HIGH	1	
341		458	WEST	N120/W105	10	MAMMALIA	UNID	AWL	SINGLE-PO	FP	DST	1	HIGH	1	
28		458	WEST	N120/W106	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	asphaltum at break
2006		458	WEST	N100/W110	20	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	DST	1	MOD	1	stained
2019		458	WEST	N110/W130	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	2	
967		458	WEST	N120/W105	40	MAMMALIA	LBF	BI-POINT	BI-POINTED	AP	MED	1	HIGH	1	deep parallel striations
83		458	WEST	N120/W108	20	MAMMAL.LARGE	UNID	AWL	SINGLE-PO	FP	DST	1	HIGH	1	striations
118		458	WEST	N120/W108	30	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	DST	1	MOD	1	
84		458	WEST	N120/W108	20	ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	MOD	1	
2485		458	WEST	N120/W107	30	ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	MOD	1	
549		458	WEST	N120/W107	30	MAMMAL.LARGE	UNID	AWL	SINGLE-PO	FP	DST	1	HIGH	1	
12		458	WEST	N120/W108	30	MAMMAL.MEDIUM	LBF	BEAD	BEAD	ORN	WHL	1	MOD	0	concretions
1169		458	WEST	N124/W105	110	BIRD	LBF	TUBE	TUBE	ORN	END	1	MOD	1	
1219		458	WEST	N124/W105	170	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	END	1	MOD	1	
1139		458	WEST	N124/W105	80	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	HIGH	1	
1204		458	WEST	N124/W105	140	ARTIO	ANT	FLAT	UNID	UN	FRG	1	MOD	2	
1125		458	WEST	N124/W105	70	ARTIO	ANT	UNID	UNID	UN	FRG	1	MOD	1	one end ground

CAT#	SUB	SITE	LOCUS	PROV	DPTH	Species	Element	Old Type	New Type	FUN	CND	CNT	POLISH	BURN	COMMENTS
1027	C	458	WEST	N124/W105	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	MOD	1	
1094	B	458	WEST	N124/W105	50	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	1	
495		458	WEST	N124/W105	10	MAMMAL.LARGE	RIB	UNID	UNID	UN	FRG	1	MOD	1	stained
1183		458	WEST	N124/W105	120	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	MRG	1	MOD	1	
1050		458	WEST	N124/W105	30	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	HIGH	2	
1071		458	WEST	N124/W105	40	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	2	
1094	A	458	WEST	N124/W105	50	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	MOD	1	
731		458	WEST	N122/W110	60	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	MED	1	HIGH	2	
698		458	WEST	N122/W110	40	MAMMAL.LARGE	RIB	STRIGIL	CURVED-T	PC	MRG	1	HIGH	1	
641		458	WEST	N122/W110	10	MAMMAL.LARGE	UNID	UNID	UNID	UN	MED	1	HIGH	1	
816		458	WEST	N122/W107	30	MAMMAL.LARGE	UNID	UNID	UNID	UN	MRG	1	HIGH	1	concretions. nice. in three pieces
791		458	WEST	N122/W107	20	MAMMAL.LARGE	UNID	UNID	UNID	UN	MRG	1	HIGH	1	nice
404		458	WEST	N122/W108	10	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	FP	DST	1	MOD	1	
1070		458	WEST	N124/W105	40	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	FP	DST	1	HIGH	1	
1069	B	458	WEST	N124/W105	40	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	2	
1069	A	458	WEST	N124/W105	40	ARTIO	ANT	UNID	UNID	UN	FRG	1	MOD	1	
1093	B	458	WEST	N124/W105	50	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	1	
1027	B	458	WEST	N124/W105	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	HIGH	2	
1023		458	WEST	N124/W105	20	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	FRG	1	MOD	0	
119		459		S5/E5	40	ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	MOD	1	parallel striations along one margin
115		459		S5/W0	50	MAMMAL.LARGE	RIB	UNID	UNID	UN	MED	1	HIGH	1	
11		459		S0/W0	30	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	
80		459		S1/W0	43	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	1	
108		459		S1/E5	10	MAMMAL.MEDIUM	LBF	AWL	SINGLE-PO	FP	DST	1	HIGH	1	perpendicular striations
70		459		S1/W0	20	MAMMAL.MEDIUM	LBF	BI-POINT	BI-POINTED	AP	MED	1	MOD	1	just striations on one side
51		459		N1.5/E5	50	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	FRG	1	NON	3	
45		459		N1.5/E5	40	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	MOD	3	
62		636		T4	50	MAMMAL.LARGE	FLAT	FLAT	UNID	UN	FRG	1	MOD	2	
225		637		S31/W3	130	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	2	
53		637		S10/W0	60	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	MRG	1	HIGH	1	asphaltum on cortex
238		637		S33/W3	70	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	2	parallel striations
217		637		S31/W3	120	ARTIO	METAP	UNID	UNID	UN	PRX	1	HIGH	0	
9		637		(B1)		MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	1	
347		637		T4-27-1	28	MAMMAL.LARGE	UNID	UNID	UNID	UN	MED	1	MOD	1	
321		637		T4-27-1	80	MAMMAL.LARGE	UNID	UNID	UNID	UN	MED	1	MOD	2	scored end, worn surface
132		637		S27/W3	140	MAMMAL.LARGE	RIB	FLAT	UNID	UN	FRG	1	HIGH	1	parallel striations
1222		696	DEEP	SW-1	410	LM	LBF	SERRATE	SERRATE	AR	MRG	1	MOD	0	
681		696	EAST	S2.5/E25	110	MAMMAL.LARGE	RIB	UNID	UNID	UN	FRG	1	MOD	1	parallel striations
1024		696	EAST	S2.5/E25	110	MAMMAL.LARGE	FLAT	UNID	UNID	UN	MRG	1	MOD	1	+8 deep parallel striations
985		696	EAST	S2.5/E28	40	MAMMAL.LARGE	UNID	UNID	UNID	UN	MRG	1	MOD	1	

CAT#	SUB	SITE	LOCUS	PROV	DPTH	Species	Element	Old Type	New Type	FUN	CND	CNT	POLISH	BURN	COMMENTS
1034		696	EAST	S2.5/E25	120	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	
1187		696	EAST	S9/E18	110	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	MRG	1	MOD	2	totally polished w/parallel striations
1178		696	EAST	S9/E18	100	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	1	
1170		696	EAST	S9/E18	90	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	3	
706		696	EAST	S2.5/E22	110	MAMMAL.LARGE	RIB	FLAT	UNID	UN	FRG	1	MOD	1	
679		696	EAST	S2.5/E22	110	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	NC	1	HIGH	3	perpen striations
1425		696	NON	N90dE@38.0	126	DEER	SCAP.L	SERRATE	SERRATE	AR	PRX	1	MOD	3	
556		696	NON	(B1)		MAMMAL.LARGE	UNID	FLAT	UNID	UN	MED	1	HIGH	1	
2074		696	NON	NORTH		ARTIO	ULNA.L	UNID	UNID	UN	PRX	1	NON	3	striations and polish
2075		696	NON	NORTH	0	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	DST	1	NON	1	bone flake w/use-wear at end
2006		696	NON	T12-1-2	90	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	FP	DST	1	MOD	3	
1339		696	NON	S41dW@7.8	94	ARTIO	ULNA.L	UNID	UNID	UN	PRX	1	MOD	1	
1295		696	NON	T7-27-1	320	MAMMAL.LARGE	SCAP	SERRATE	SERRATE	AR	MRG	1	MOD	3	broken at stop
1275		696	NON	T5-2-12	60	DEER	SCAP.R	SERRATE	SERRATE	AR	PRX	1	MOD	3	
1396		696	NON	S23d@78.0	77	MAMMAL.LARGE	LBF	UNID	UNID	UN	PRX	1	HIGH	3	
1350		696	NON	S22dW@16.9	89	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	DST	1	MOD	3	
1351		696	NON	S38dW@14.2	101	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	NC	1	MOD	1	striations
1389		696	NON	S24dW@61.4	60	ARTIO	SCAP.R	SERRATE	SERRATE	AR	PRX	1	MOD	3	parallel striations
3070		696	NON	EXP3	80	MAMMAL.SMALL	LBF	UNID	UNID	UN	MED	1	MOD	3	
1653		696	NON	M25s	10	MAMMALIA	LBF	BI-POINT	BI-POINTED	AP	MED	1	HIGH	2	
1704		696	NON	M25s	80	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	2	
1869		696	NON	EXP2:SE1/2	225	MAMMAL.LARGE	SCAP.L	SERRATE	SERRATE	AR	MED	1	MOD	3	poss carnivore chewing
1783		696	NON	EXP1	100	MAMMAL.LARGE	LBF	BI-POINT	BI-POINTED	AP	MED	1	HIGH	0	
3071		696	NON	EXP1	100	MAMMAL.LARGE	UNID	UNID	UNID	UN	MED	1	MOD	3	poss hollowed out
1764		696	NON	EXP1	BKDRT	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	DST	1	MOD	1	weathered
1591		696	NON	M20s	20	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	1	
1894		696	NON	EXP5	BKDRT	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	AR	DST	1	MOD	0	diagonal striations at dst
1908		696	NON	EXP5(SW)	100	BIRD	ULNA	WHISTLE	TUBE, SING	ORN	MED	1	HIGH	0	
1914		696	NON	EXP6(E)	60	ARTIO	SCAP.L	SERRATE	SERRATE	AR	PRX	1	MOD	3	
627		696	NON	F11		MAMMAL.LARGE	LBF	UNID	UNID	UN	PRX	1	HIGH	3	
624		696	NON	F7		MAMMAL.LARGE	UNID	BI-POINT	BI-POINTED	AP	MED	1	HIGH	1	
614		696	NON	F20		MAMMAL.LARGE	LBF	AWL	SINGLE-PO	FP	WHL	1	HIGH	3	
615		696	NON	F20	79	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	HIGH	1	
1993		696	NON	(B144)		ARTIO	SCAP.L	SERRATE	SERRATE	AR	MRG	1	MOD	3	
148		696	NON	(B142)		ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	MOD	1	
504		696	NON	(B6)		ARTIO	ANT	UNID	UNID	UN	MED	1	NON	2	
178		696	NON	(B149)		MAMMALIA	LBF	BI-POINT	BI-POINTED	AP	MED	1	HIGH	1	
470		696	NON	(B153EXP)		MAMMAL.LARGE	LBF	AWL	SINGLE-PO	FP	NC	1	HIGH	0	
306		696	NON	(B30)		MAMMALIA	LBF	UNID	UNID	UN	MED	1	HIGH	1	
74		696	NON	(B48)		MAMMALIA	LBF	BI-POINT	BI-POINTED	AP	MED	1	MOD	0	

CAT#	SUB	SITE	LOCUS	PROV	DPTH	Species	Element	Old Type	New Type	FUN	CND	CNT	POLISH	BURN	COMMENTS
118	A	696	NON	B81		ELK	METAP	STRIGIL	CURVED-T	PC	WHL	1	HIGH	3	large perf @ dst end (=prx end of tool)
1749		696	NON	BK 1/2:S6/E1.5	75	ELK	SCAP	SERRATE	SERRATE	AR	MED	1	NON	3	
1721		696	NON	BK 1/5:BLW A	40	MAMMAL.LARGE	TIBIA	AWL	SINGLE-PO	FP	NC	1	NON	3	
2047		696	NON	BS1:SPOILS		CANIS	MAND.R	INCISED	TUBE	ORN	NC	1	HIGH	2	
118	B	696	NON	B81		ELK	METAP	STRIGIL	CURVED-T	PC	WHL	1	HIGH	3	large perf @ dst end (=prx end of tool)
118	D	696	NON	B81		ELK	METAP	STRIGIL	CURVED-T	PC	NC	1	HIGH	3	non-perf (?), under first 3
171		696	NON	(B138)		ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	MOD	0	
118	C	696	NON	B81		ELK	METAP	STRIGIL	CURVED-T	PC	NC	1	HIGH	3	non-perf (?), under first 2
1132		696	WEST	S9/E9	90	ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	MOD	1	
1962		696	WEST	S9/E9	100	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	FRG	1	MOD	2	
1133		696	WEST	S9/E9	90	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	MOD	2	
1146		696	WEST	S9/E9	100	ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	HIGH	1	
740		696	WEST	N0/W5	90	MAMMAL.LARGE	UNID	UNID	UNID	UN	MRG	1	MOD	1	parallel striations
725		696	WEST	N0/W5	80	ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	MOD	1	
739		696	WEST	N0/W5	90	MAMMAL.LARGE	LBF	AWL	SINGLE-PO	FP	DST	1	MOD	3	
726		696	WEST	N0/W5	80	ARTIO	ANT	AWL	ANTLER, D	LP	DST	1	HIGH	1	
738		696	WEST	N0/W5	90	MAMMALIA	UNID	AWL	SINGLE-PO	FP	DST	1	MOD	2	
788		696	WEST	N0/W2	90	MAMMAL.MEDIUM	UNID	UNID	UNID	UN	FRG	1	MOD	1	parallel and perpen striations
1080		696	WEST	S9/W2	80	BIRD	LBF	UNID	UNID	UN	FRG	1	MOD	1	striations
1103		696	WEST	S9/W2	100	DEER	METAT	AWL	SINGLE-PO	FP	NC	1	NON	3	
1063		696	WEST	S9/W2	60	ARTIO	ANT	UNID	UNID	UN	MED	1	MOD	2	striations
815		696	WEST	N0/W2	120	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	HIGH	1	
1092		696	WEST	S9/W2	90	MAMMAL.SMALL	LBF	BEAD	BEAD	ORN	END	1	HIGH	1	
917		696	WEST	S3/W5	70	MAMMAL.LARGE	LBF	BI-POINT	BI-POINTED	AP	MED	1	HIGH	1	
966	B	696	WEST	S3/W5	110	MAMMAL.LARGE	UNID	FLAT	UNID	UN	MRG	1	HIGH	1	
966	C	696	WEST	S3/W5	110	BIRD	UNID	UNID	UNID	UN	FRG	1	HIGH	1	
836		696	WEST	S3/W2	70	MAMMAL.MEDIUM	LBF	UNID	UNID	UN	FRG	1	MOD	2	perpen and par striations
846		696	WEST	S3/W2	80	MAMMAL.LARGE	FLAT	FLAT	UNID	UN	FRG	1	MOD	2	
829		696	WEST	S3/W2	60	MAMMAL.LARGE	LBF	STRIGIL	CURVED-T	PC	MRG	1	MOD	2	
828		696	WEST	S3/W2	60	MAMMAL.LARGE	LBF	UNID	UNID	UN	MED	1	MOD	1	
949		696	WEST	S3/W5	100	ARTIO	ANT	UNID	UNID	UN	MED	1	NON	3	
890		696	WEST	S6/W2	80	MAMMAL.LARGE	UNID	FLAT	UNID	UN	MED	1	MOD	2	
906		696	WEST	S8/E9.5	75	MAMMAL.LARGE	UNID	UNID	UNID	UN	MED	1	HIGH	1	
1114		696	WEST	S9/E9	70	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	MOD	2	striations
876		696	WEST	S6/W2	70	MAMMAL.LARGE	LBF	UNID	UNID	UN	FRG	1	MOD	2	
936		696	WEST	S3/W5	80	ARTIO	ANT	UNID	UNID	UN	FRG	1	HIGH	1	
966	A	696	WEST	S3/W5	110	MAMMAL.LARGE	LBF	UNID	UNID	UN	MRG	1	HIGH	1	bone splinter/ needle
948		696	WEST	S3/W5	100	MAMMAL.LARGE	UNID	UNID	UNID	UN	MED	1	NON	2	

Miscellaneous Stone 1 of 1

Pecked Slab

ACC #	CAT #	Site	Condition	Shape	Form	Material	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Provenience	Depth	Context	Feature	Remarks
95-8	1431	CCO-696W	Complete	Unshaped	Pecked Slab	Sandstone	457	286	44		6.6M@N43W A	67			
95-8	649	CCO-696W	Complete	Unshaped	Pecked Slab	Sandstone	266	136	83	4989.6	EXP. 5, FEAT 13				
95-8	1374	CCO-696W	Complete	Unshaped	Pecked Slab	Sandstone	215	199	185	4620	33.6M@N61E M2	138			

Obsidian Cobble

ACC #	CAT #	Site	Condition	Shape	Form	Material	Length (mm)	Width (mm)	Thick (mm)	Weight grms	Provenience	Depth	Context	Feature	Remarks
95-8	1330	CCO-696W	Cobble			Obsidian (NV)	39	24.1	12.9		TRENCH	000-050			

APPENDIX D

HUMAN BURIALS

HUMAN BURIALS

By Judith Gregg and Jonathan Legare, under the direction of Lori Hager, Ph.D.

INTRODUCTION

A total of 198 human burials were excavated from three sites (CA-CCO-458, -637, -696). Two other sites (CCO-459, -631) contained unassociated human skeletal remains representing a minimum of 8 individuals. All human remains recovered during the project were analyzed by ASC personnel under the supervision of Dr. Lori Hager of Hager/Holson and Associates. A volume containing the skeletal inventory, osteometric data, and nonmetric observations recorded for each burial will be on file at the Northwest Information Center of the California Historical Resources Information System, Sonoma State University. All of the human remains and artifacts collected during burial excavation are to be reburied.

METHODS

The methods of burial exposure and removal are briefly described in the Field Methods section of this report. Below are the criteria used in the field and laboratory to make such determinations as flexure and orientation of burials, artifact association, age and sex of individuals, as well as the measurements and observations made to identify pathologies and other anomalies.

DESCRIPTIVE FIELD CRITERIA

Flexure and Orientation

Burial flexure was defined in the field based on the angle between the femur and the torso and the femur and the tibia. Four degrees of flexure were defined: tight flex, loose flex, semi-extended, and extended. When the angle between the midline of the torso and the distal femur was between 0 and 60 degrees, the burial was considered to be a tight-flex; when the angle was between 61 and 120 degrees, it was considered a loose flex; when between 121 and 180 degrees, it was considered extended. When describing extended burials, the angle between the proximal femur and the distal tibia was also considered; when that angle was between 0 and 90 degrees, it was considered semi-extended; when it was between 91 and 180 degrees, it was considered extended.

Burial orientation was determined in the field by taking bearings along a line between the center of the torso and the top of the cranium; bearings were taken with reference to magnetic north. When the burial was heavily deteriorated, orientation was estimated based on the alignment of the vertebral column or other in situ elements. In several instances, burials were so heavily disturbed that no orientation or position could be determined.

In the laboratory, burial flexure and position were determined by examining field notes, in situ illustrations, and photographs. Burial position is described as either left side, right side, ventral (on stomach), or dorsal (on back).

Artifact Association

Archaeological material considered to represent general habitation debris, such as stone flaking debris and burnt and unburnt mammal-bone fragments, was regularly found within burial matrices. Particularly at CCO-458 and CCO-696, there was substantial evidence of burial disturbance either from aboriginal activities or through natural means (bioturbation or pedoturbation). Rather than considering this material to be intentional grave offerings, we assumed that habitation debris found in burial matrices was introduced, either through burial-pit backfill or some other natural or mechanical process. For the purposes of analysis, only *formal* artifacts (e.g., shell beads, ornaments, projectile points) found in close proximity (less than 15 cm) to burials were considered to be direct associations. In a few cases, unusual faunal material (e.g., bear, eagle), commingled with the skeleton, was also determined to be associated. For the purposes of repatriation, however, all material collected from burial and exposure matrices was included with the skeletal remains for reburial.

LABORATORY METHODS

The condition of the burials ranged from good to very poor. Many of the burials were highly fragmented due to prehistoric disturbance, other natural postdepositional processes, and/or the use of heavy equipment at the site. In addition, once the burials were exposed, many of the bones became unstable. Due to the fragile nature of some of these exposed bones, in certain instances the identification of elements relied on field observations. Thus, whenever bony elements were too fragmentary to identify in the lab, we recorded the field identification of the elements in the inventory.

In the laboratory, all the bones were washed, sorted by element and side, and inventoried. Once inventoried, each burial was then examined for a determination of age, sex, and overall health of the individual at the time of death. Cranial, dental, and postcranial metric measurements were then taken whenever the bones were complete enough to measure. Nonmetric traits were scored for the cranium. All burials were checked by Dr. Hager before being reboxed for reburial at a later date.

Age Determination Criteria

Age was determined using as many criteria as available, always giving greater weight to the more reliable age determinants. Patterns of dental eruption (Gustafson and Koch 1974; Ubelaker 1989) and epiphyseal union (McKern and Stewart 1957; Krogman and Isçan 1986) were given the greatest weight, especially for the subadult and early adult material. Subadult age determinations were also made based on long-bone lengths (Johnston 1962; Ubelaker 1989). For the adults, characteristics of the symphyseal face of the pubis (McKern and Stewart 1957, as cited in White 1986; Todd 1920) were given higher rank over patterns of dental attrition (Lovejoy 1985) and cranial suture closure (Meindl and Lovejoy 1985).. Aging by dental attrition, however, was particularly useful on those individuals in the adolescent and early-adult phases. In addition, in the absence of a pubic symphyseal face (which is often the case), the pattern of dental attrition for an individual was given greater weight as a relative age marker.

For many burials, only fragments of the cranium were available for use in age determination. In these instances, we relied on endo- and ectocranial suture closure to make age assessments even though the variability in suture closure among modern humans may be great (Isçan and Loth 1989; Perizonius 1984). Thus while cranial suture closure was used more cautiously than the other aging criteria, we nonetheless used this method of age determination in the absence of other markers. Finally, we examined the sternal end of the ribs for deteriorations characteristic of certain ages as outlined in (Iscan, Loth, and Wright 1985). This latter technique did not prove very consistent and was only used when no other age markers were available.

Sex Determination

The criteria for determining sex were also ranked. Due to their high predictive value in assessing sex, pelvic traits were given the highest priority based on criteria outlined in Hager (1989,1996) These included the discriminatory features of the greater sciatic notch, the superior pubic ramus, and the pubic body.

Cranial and mandibular traits were also used to determine sex, following Bass (1971) and Krogman and Isçan (1986). The supraorbital region, the mastoids, and the external occipital protuberance were most common cranial features available for sex determination in this sample. On the mandible, the gonial angle and the symphyseal region were the best preserved for analysis.

Overall robusticity was a relatively low-ranking criterion for sex determination when it became clear early in the analysis that body size showed overlap between the sexes. That is, when sex was determined by criteria other than size in this sample, such as by the pelvis, some females were large and robust and some males were small and gracile. Nonetheless, when body size was the only way to determine sex, those individuals that were clearly large and rugged were assigned to the "possible male" category, and those who were clearly small and gracile were assigned to the "possible female" category, with the notation that this assessment was based on body size only.

Due to the fragmentary nature of the sample in general, sex was indeterminate for a large number of these burials. For some individuals, when the determination of sex was based on low-ranking criteria (such as robusticity as outlined above), sex was assigned as "possible" male or female. A "probable male" or "probable female"

assignment means that multiple criteria were available for sex determination but that the available criteria were not strong enough to be 95% certain that the skeleton was one sex and not the other. Sex determination was not attempted for the subadult material due to the lack of reliable sex markers in this age group.

Pathologies

The bones were also examined for any anomalies or pathologies in order to determine the overall health of the individual at the time of death. In most instances, this was a macroscopic examination of the gross morphology of the bone. Occasionally, bones were examined using a stereomicroscope (ranging in magnification from 10X to 40X) in order to determine if there had been microscopic changes in the cortical bone or in the dentition. Assessments of the various pathological conditions follow diagnoses outlined in Huss-Ashmore et al. (1982); Ortner and Putschar (1985); Rose, Condon, and Goodman (1985); Sarnat and Schour (1941); Ubelaker (1989); and White (1986).

Metric Measurements

Cranial, dental, and postcranial measurements were taken on the more complete bones using digital, spreading and coordinate calipers, while long bones were measured using an osteometric board. Cranial measurements follow those outlined in Bass (1971); postcranial measurements follow those presented in Larsen (1982). All measurements are in millimeters.

Only a few crania were complete enough in this sample to warrant full measurement. Estimates on fragmentary remains were sometimes attempted; these measurements are given in parentheses on the measurement forms.

As is often the case, the dentition was better preserved than the crania, and at least some dentition was available for analysis for many individuals. Mesio-distal and buccal-lingual lengths were taken using the digital calipers. Only those teeth with sufficient crown present were measured.

Postcranial measurements were limited due to the incompleteness of the long bones. For the appendicular skeleton, midshaft measurements were taken more frequently than were the total lengths or the dimensions of the articular surfaces. For the axial skeleton, a few measurements were possible, including the dimensions of the pelvic elements and the clavicles. Stature estimations were calculated whenever long bones length were available. These estimations follow the regression formulae in Trotter and Gleser (1952, 1958) and Trotter (1970).

Nonmetrics

A series of nonmetric cranial traits were scored as present or absent based on traits outlined in Berry and Berry (1967), Ossenburg (1969), and El-Najjar and McWilliams (1978). In addition, some qualitative assessments of the nonmetric traits were made (e.g., number of supraorbital foramina, location of mastoid foramen). Postcranially, only the presence of a preauricular sulcus or dorsal pubic pitting on the pelvis was noted.

BURIAL DESCRIPTIONS

CA-CCO-458

Three burials were identified in the Brentwood alluvium during area exposure excavation at CCO-458—the remains of an adult female, an adult possible female, and an infant. Due to postdepositional disturbance, the burials were largely incomplete.

Burial 1

Burial 1 was an adult female who was more than 18 years of age at the time of death. This burial was located in AEUs N126/W104-W103, at a depth of 48 to 60 cm below grid datum in the Brentwood alluvium.

This burial was a partial cremation, found intermixed with the nonburnt remains of an infant, identified in the field as Burial 1b. In the lab, the designation was changed to Burial 3. The preservation of the remains of Burial 1 was moderate. Although all skeletal sections were represented to varying degrees, all elements were incomplete and extremely fragmented. Based on epiphyseal union of the femur and portions of the pelvic girdle, the individual was determined to be an adult. Based on the morphology of the sacrum, the sex of the individual was determined to be female. No pathologies were noted. Postcranial measurements were limited to the pelvic girdle.

Wood charcoal, found in high concentrations around the cremated remains, was collected and submitted for radiocarbon analysis, producing a date of 430 +/- 40 B.P. (Beta-81782), for a calibrated age of 465 cal B.P.

Burial 2

Burial 2 was an adult possible female who was more than 26 years of age at the time of death. This burial was located in AEU N124-N122/W110, at a depth of 54 to 66 cm below grid datum in the Brentwood alluvium.

The preservation of the remains was good, although very fragmented. All skeletal sections were represented, but only to very limited degrees. Based on epiphyseal union, dental wear, and endocranial suture closure, the age of the individual was determined to be 26-31+ years. Based on the overall gracility of the upper and lower limbs, the sex of the individual was determined to be female. Severe degenerative arthritis with porosity, marginal lipping, and eburnation was present on the left patella. Osteophytes were also present on the intermediate phalanx. Hypercementosis was present on the mandibular left canine. Various postcranial measurements were recorded.

Burial 3

Burial 3 was a fetus/infant of indeterminate sex who was 0-3 months of age at the time of death. This individual was recovered with Burial 1.

Burial 3 was originally identified in the field as Burial 1B. Burial 3 showed no signs of burning. The preservation of the remains was good, with some elements complete. Based on an unfused basilar sphenoid and mandible, the state of dental eruption, and left radius diaphysis length, the age of the individual was determined to be fetal/infant. Due to the age of the individual, sex could not be determined. No pathologies were noted. Cranial measurements and the scoring of nonmetric cranial traits were limited to the mandible. Postcranial measurements were limited to the left radius.

CA-CCO-459

The partial remains of an infant were identified in the laboratory. The human remains were found in material collected during exposure of the bedrock outcrop on the south end of Exposure 2.

Burial 1

Burial 1 was a fetus/infant of indeterminate sex who was 0-6 months of age at the time of death. This burial was located in AEUs S5-S6/E5, above the bedrock outcrop, at a depth of 0-40 cm below surface, in Soil Unit 2.

The preservation of the remains was good, with some elements complete. Based on epiphyseal union, and right tibia diaphysis length, the age of the individual was determined to be 0-6 months. Due to the age of the individual, sex could not be determined. No pathologies were noted. Postcranial measurements were recorded for the right radius, left femur, and right tibia.

CA-CCO-631

The remains of five adults and two juveniles were recovered from spoils deposited in the Vasco Road right-of-way during quarrying activities at the Unimon sand plant. Most of the remains showed recent fractures resulting from their accidental removal by heavy equipment. The natural preservation of the remains was good to excellent. Despite the fragmentary nature of the remains, all of the major skeletal sections were represented.

Burials 1 to 7

The five adults (Burials 1 to 5) were determined to have been more than 18 years of age at the time of death based on epiphyseal union, dental eruption, dental wear, and endocranial suture closure. One of the adults was no more than 30 years of age, based on an unfused clavicle sternal end. Due to the lack of indicators, the sex of these individuals could not be determined. Osteophytic lipping was noted on some vertebrae. No measurements or nonmetric traits were recorded.

Burial 6 was a juvenile of indeterminate sex who was 4 to 6 years of age at the time of death. The individual was represented by some teeth, and a femur diaphysis. The age of the individual was determined by

epiphyseal union, dental eruption, dental wear, and length of the left femur. Due to the young age of the individual, sex could not be determined. No pathologies were noted. Postcranial measurements were limited to the left femur. No nonmetric traits were recorded.

Burial 7 was a juvenile of indeterminate sex who was 3 to 5 years of age at the time of death. The individual was represented by some teeth and a femur diaphysis. The age of the individual was determined by dental eruption, and length of the left femur. Due to the young age of the individual, sex could not be determined. No pathologies were noted. Postcranial measurements were limited to the left femur. No nonmetric traits were recorded.

CA-CCO-637

A total of 18 burials were recovered from Soil Unit I at CCO-637—1 during VU excavation and 17 during monitored site grading. The burial population was made up of 15 adults, 1 adolescent/adult, 1 adolescent, and 1 juvenile. These included 2 females, 2 probable females, 2 possible females, and 2 males. No sex assignment could be made for 10 individuals. Four burials were associated with artifacts.

Burial 1

Burial 1 was an adult female who was 20-30 years of age at the time of death. This burial was located at grid coordinates S50/W0, 70 to 90 cm below the surface. This burial was a primary inhumation, interred in a flexed position, on the left side, oriented 205° from magnetic north. The individual was facing west.

The preservation of the remains was poor. Although all skeletal sections were represented, the remains were very fragmentary and incomplete. Based on epiphyseal union, dental eruption, dental wear, and endocranial suture closure, the age of the individual was determined to be 20-30 years. Based on the configuration of the greater sciatic notch, the raised auricular surface, and the presence of a pronounced preauricular sulcus, the sex of the individual was determined to be female. No pathologies were noted. No complete measurements were possible.

A lump of red ochre was found just above the knee of Burial 1.

Burial 2

Burial 2 was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of S66°W from Datum M3. The burial was situated 31 cm below datum within Soil Unit I, Ab horizon. The type of disposal was indeterminate.

Preservation of the remains was very poor and fragmentary, with the individual being represented by only two rib sections and more than 200 miscellaneous bone fragments. Due to the poor condition, age and sex could not be determined. No pathologies were noted. No measurements were possible.

Burial 3

Burial 3 was an adolescent/adult of indeterminate sex who was more than 16 years of age at the time of death. This burial was located at a bearing of N1°W at 76 m from Datum M2. The individual was situated 36 cm below Datum M4, within Soil Unit I, Ab horizon. This burial was a primary inhumation. The position and orientation of the burial could not be determined.

The preservation of the remains was poor and very fragmentary, with only a few fragments of the upper and lower limbs represented. Based on the epiphyseal union of the distal left radius and the left talus, the age of the individual was determined to be juvenile/adult. Due to the poor preservation, the sex of the individual could not be determined. No pathologies were noted. Various postcranial measurements were recorded.

Burial 4

Burial 4 was an adult male who was 25-35 years of age at the time of death. The burial was located at a bearing of S77°W at a distance of 26 m from Datum M4. The burial was situated 97 to 117 cm below Datum M4. This burial was a primary inhumation, interred in a semi-extended position on the right side; the burial was oriented 340° from magnetic north, with the cranium oriented northeast.

The remains were poorly preserved and very fragmented. Although all skeletal sections were represented, many portions could only be identified and sided in the field. Based on epiphyseal union, and dental wear, the age of the individual was determined to be 25-35 years. Based on the rugosity present on the lingual side of the right gonial angle, and the overall robustness of the shoulder girdle, upper limbs, and lower limbs, the sex of the individual was determined to be male. Evidence of antemortem loss of the maxillary left P3 and P4 with the resorption of the alveolar process in those areas, was present. There also appeared to be either a congenital absence of the mandibular left M3, or a loss of the M3 with ensuing resorption of the alveolar process. Various dental and postcranial measurements were recorded.

Burial 5

Burial 5 was an adult of indeterminate sex who was 20-24 years of age at the time of death. This burial was located at a bearing of S83°W at a distance of 38 m from Datum M4. The individual was situated 37 to 52 cm below Datum M4, in Soil Unit I, Ab horizon. This burial was a primary inhumation, interred in a ventrally extended position, oriented 340° from magnetic north, with the head facing down.

Although all skeletal sections were represented, the remains were poorly preserved and very fragmented. Based on epiphyseal union, dental eruption, and dental wear, the age of the individual was determined to be 20-24 years. Due to the poor preservation of the remains, the sex of the individual could not be determined. Slight horizontal grooves and slight surface pitting were present on various anterior teeth. Enamel extensions were present on the buccal sides of most molars. Dental measurements were recorded for all teeth, while postcranial measurements were limited to the upper limbs.

A complete chert projectile point (95-7-402) was found in the right side of the chest area, inferior to the midshaft of the clavicle.

High concentrations of charcoal were identified in the burial matrix, in and immediately surrounding the skeleton. An absence of charcoal in the soil adjacent to the interment suggested that the charcoal was introduced to the matrix at the time of burial. Charcoal collected from the vicinity of the rib cage, produced a radiocarbon date of 4950 +/- 90 B.P. (Beta-93706), or a calibrated date of 5665 cal B.P.

Burial 6

Burial 6 was an adult female who was 22-26 years of age at the time of death. This burial was located at a bearing of S88°W at a distance of 29.6 m from Datum M4. The burial was located 102 cm below Datum M4, in Soil Unit I, Ab horizon. This burial was a primary inhumation, interred in a loose flex position on the right side, and oriented 290° from magnetic north, with the head facing southwest.

The remains were very poorly preserved and very fragmentary. Although all skeletal sections except the shoulder girdle were represented, many elements could only be identified and sided in the field. Based on dental eruption, dental wear, and endocranial suture closure, the age of the individual was determined to be 22-26 years. Based on a medially elongated superior pubic ramus, a square pubic body, a short anterior sciatic notch relative to the acetabulum, and an everted ischiopubic ramus, the sex of the individual was determined to be a female. A slight groove near the cervicoenamel junction of the maxillary right P3 was present. Anomalous enamel pearls were present on the maxillary M2s, and an enamel extension was on the buccal side of the maxillary left M1. Due to a lack of a posterior facets on the maxillary M2s, it is possible that this individual had a congenital absence of the maxillary M3s. Various dental and postcranial measurements were recorded.

Burial 7

Burial 7 was an adult possible female who was 20-25 years of age at the time of death. This burial was located at a bearing of S85°W at a distance of 28.5 m from Datum M4. The burial was located 102 cm below the datum plane, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a semi-extended position, on the right side, oriented 290° from magnetic north, with the head facing south.

The remains were poorly preserved and very fragmentary. Although all skeletal sections except the shoulder girdle were represented, the elements were fragmentary. Based on the epiphyseal union of the femora, and dental wear, the age of the individual was determined to be 20-25 years. A possible female was indicated by the moderate rugosity of the lingual surface of the right side gonial angle, and the gracile dimensions of the right

humerus. Enamel hypoplasia was present on various anterior teeth. Enamel extensions were present on the buccal sides of all mandibular molars, and most maxillary molars. Dental measurements were recorded.
A complete chert projectile point (95-7-401) was found in the thoracic area atop the lateral surfaces of the left ribs. The base of an obsidian projectile point (95-7-400) was found below and slightly to the right of the chert point. A single obsidian biface fragment (95-7-417) was found just right of artifact 95-7-400. Both Napa Valley obsidian specimens had mean hydration rim values of 3.0 microns, indicating that each may have originally been part of the same artifact.

Several large pieces of charcoal collected from the burial matrix were submitted for radiocarbon analysis, resulting in a date of 5090 +/- 80 B.P. (Beta-93707), or 5795 cal B.P.

Burial 8

Burial 8 was an adult probable female who was 19-25 years of age at the time of death. This burial was located at a bearing of N77°W at a distance of 30.8 m from Datum M4. The burial was located 53 cm below Datum M4, in Soil Unit I, Ab horizon. This burial was a primary inhumation, interred in a loose flex position, on the left side. The left arm crossed the body with the hand near the pelvis, and the right arm was flexed with the hand under the cranium. The orientation was 357° from magnetic north, with the head facing southeast.

The remains were poorly preserved and very fragmented. Although all skeletal sections were present, some elements could only be identified and sided in the field. Based on epiphyseal union of the humeri, and femora, along with dental eruption and wear, the age of the individual was determined to be 19-25 years. Based on the moderate dimensions of the right mastoid, the slight rugosity of the lingual surface of the right side gonial angle, and the gracile dimensions of the upper and lower limb bones, the sex of the individual was determined to be a probable female. Slight surface grooving and pitting was noted on various teeth. An anomalous enamel extension was present on the buccal side of the mandibular right M2. Various cranial, dental, and postcranial measurements were recorded, as were various cranial nonmetric traits.

Burial 9

Burial 9 was an adult male who was 18-22 years of age at the time of death. The burial was located at a bearing of N73°W at a distance of 23.2 m from Datum M4. The burial was situated 40 cm below Datum M4 in soil unit I. This burial was a primary inhumation, interred in an undetermined position on the left side, oriented 280° from magnetic north, with the head facing northeast.

The preservation of the remains was poor and very fragmented. All skeletal sections except the shoulder girdle and pelvic girdle were represented by incomplete elements. Based on dental eruption, dental wear, and endocranial suture closure, the age of the individual was determined to be 18-22 years. Based on a very robust supraorbital torus, and left mastoid, the sex of the individual was determined to be male. No pathologies were noted. Limited cranial, dental, and postcranial measurements were recorded, along with limited nonmetric cranial traits.

A portion of *Haliotis* shell (95-7-419) was recovered from the lower thoracic region of the individual, atop the lateral surfaces of the right ribs.

Burial 10

Burial 10 was an adult probable female who was 18-30 years of age at the time of death. This burial was located at a bearing of S62°W at a distance of 32.5 m from Datum M4. The burial was situated 90 cm below Datum M4, in Soil Unit I, Ab horizon. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 280° from magnetic north.

The remains were poorly preserved. Although all skeletal sections were represented, they were very fragmentary, some being identifiable and sided only in the field. Based on the epiphyseal union of a hand phalanx, dental eruption, and dental wear, the age of the individual was determined to be more than 18 years. Based on the configuration of the sciatic notch, the sex of the individual was determined to be probable female. Enamel hypoplasia was evident on both the maxillary and mandibular right canines. Dental measurements were recorded.

Burial 11

Burial 11 was an adult of indeterminate sex who was more than 30 years of age at the time of death. This burial was located at a bearing of N77°W at a distance of 50.0 m from Datum M4. The burial was situated 29 cm below Datum M4, in soil unit I, Ab horizon.

This burial is represented by portions of the cranium, a humeral head fragment, and more than 100 unidentifiable bone fragments. Preservation of the remains was poor. It was determined that the individual was probably more than 30 years of age at the time of death, based on dental eruption, and dental wear. Due to the poor condition of the few remains, the sex of the individual could not be determined. Slight surface pitting was present on the buccal surface of the mandibular left I2. No measurements were possible.

Burial 12

Burial 12 was an adolescent of indeterminate sex who was 13.5-15 years of age at the time of death. This burial was located at a bearing of S84°W at a distance of 26.2 m from Datum M4. The burial was located 113 cm below Datum M4, in Soil Unit I, Ab horizon. This burial was a primary inhumation, interred in a dorsally extended position, with the left arm across the axial area, and the right arm and hand positioned towards the cranium.

The preservation of the remains was poor and very fragmentary. All skeletal sections were represented except the shoulder girdle. Based on the state of epiphyseal union, dental eruption, and dental wear, the age of the individual was determined to be 13.5-15 years. Due to the young age of this individual, sex could not be accurately determined. Enamel hypoplasia in the form of slight transverse grooves and pitting was present on the buccal surface of a number of anterior teeth. Single grooves were present encircling the crowns of the maxillary M3s near the cervicoenamel junction, yet were determined not to represent enamel hypoplasia. Anomalous enamel extension were present on the buccal sides of all erupted molars, including the unerupted maxillary right M3. Cranial measurements were recorded for the right mastoid and foramen magnum only. Dental measurements were recorded for all teeth. Various postcranial, and nonmetric cranial traits were also recorded.

Burial 13

Burial 13 was an adult possible female who was more than 18 years of age at the time of death. This burial was located at a bearing of N60°W at a distance of 18.9 m from Datum M4. The burial was situated 52 cm below the Datum M4 plane, in Soil Unit I, Ab horizon. This burial was a primary inhumation. The position and orientation of this burial was indeterminate.

The preservation of the remains was poor and very fragmentary. Fragments of the cranium, axial skeleton, and upper limbs, were the only elements represented. Based on the size of the left petrous pyramid, the individual was determined to be an adult. Based on the gracile dimensions of the right mastoid, the sex of the individual was determined to be a possible female. No pathologies were noted. Recorded cranial measurements, and cranial nonmetric traits were limited to the right mastoid.

Burial 14

Burial 14 was an adult of indeterminate sex who was 30-35 years of age at the time of death. This burial was located at a bearing of N62°W at a distance of 23.9 m from Datum M4. The burial was located 101 cm below Datum M4, in Soil Unit I, Ab horizon. This burial was a primary inhumation, interred in a tight flexed position, on the left side, oriented 270° from magnetic north.

The preservation of the remains was poor and very fragmented. The burial was partially disturbed by heavy equipment. All skeletal sections were represented. Based on dental wear, and endocranial suture closure, the age of the individual was determined to be 30-35 years. Due to the fragmentary condition of the remains, the sex of the individual could not be accurately determined. No pathologies were noted. Dental measurements, and postcranial measurements, were recorded.

Numerous *Olivella* beads were found with Burial 14; there were a total of 113 End-Ground beads, 483 Spire-Lopped beads, 501 Thick Rectangular beads, and 73 *Olivella* bead fragments. A large quantity of the Spire-Lopped beads were found under the left leg, organized in a belt-like pattern. A concentration of Rectangu-

lar beads was present in the lumbar area arranged in a shingled pattern. Another cluster of mixed beads was present in the abdominal area.

Charcoal and red ochre was concentrated in a thin lens below the skeleton, extending the length of the burial. The discrete lens was roughly elliptical, apparently marking the bottom of the grave-pit. The absence of charcoal in the surrounding matrix and the lack of burning on the skeletal remains, suggested that the charcoal resulted from pre-interment grave pit burning. A sample of charcoal collected from the burial matrix produced a radiocarbon date of 4140 +/- 80 B.P. (Beta-93708), or 4770 cal B.P.

Burial 15

Burial 15 was a juvenile of indeterminate sex who was 10-12 years of age at the time of death. This burial was located at a bearing of S84°W at a distance of 27.2 m from Datum M4. The burial was situated 142 cm below Datum M4, in Soil Unit I, Ab horizon. This burial was a primary inhumation, interred in a dorsally extended position, oriented 322° from magnetic north, with the head facing up and to the south-southwest.

The preservation of the remains was poor and very fragmentary. Although all skeletal sections were represented, some were so poorly preserved that they could only be identified and sided in the field. Based on the state of dental eruption, and dental wear, the age of the individual was determined to be 10-12 years. Due to the poor preservation of the remains, and the young age of the individual, sex could not be accurately determined. Enamel hypoplasia was evident in the form of slight buccal surface grooves and pitting on a number of anterior teeth. A single slight groove near the cervicoenamel junction that encircled the crown was present on the mandibular right P4. Anomalous enamel extensions were present on both the buccal and lingual sides of most molars. Dental measurements were recorded for most teeth.

Burial 16

Burial 16 was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of N42°W at a distance of 21.3 m from Datum M4. The burial was situated 37 cm below Datum M4, in Soil Unit I, Ab horizon. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 180° from magnetic north.

The preservation of the remains was poor and extremely fragmentary. The burial was represented by teeth, and portions of the upper and lower limbs. Some elements could only be identified and sided in the field. Based on the epiphyseal union of the distal right humerus, dental eruption, and heavy dental wear, the individual was determined to be an adult. Due to the poor preservation of the remains, the sex of the individual could not be determined. No pathologies were noted. Dental measurements were recorded.

Burial 17

Burial 17 was an adult of indeterminate sex who was more than 25 years of age at the time of death. This burial was located at a bearing of N72°W at a distance of 19 m from Datum M3. The burial was situated 34 cm below Datum M4 in Soil Unit I, Ab horizon. Position and orientation of this burial could not be determined.

The remains were poorly preserved and very fragmentary, represented by portions of the lower limbs. Based on the robust dimensions of the right femur, the individual was determined to be a probable adult. Due to the poor preservation of the remains, sex could not be determined. No pathologies were noted. Postcranial measurements were limited to the right femur.

Burial 18

Burial 18 was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of N54°W at a distance of 14.8 m from Datum M4. The burial was situated 46 cm below Datum M4, in Soil Unit I, Ab horizon. This burial was a primary inhumation, interred in a probable flexed position, on the left side.

The preservation of the remains was poor. Fragments of all skeletal sections except the shoulder girdle were represented, although some could only be identified and sided in the field. Based on epiphyseal union, and dental wear, the individual was determined to be more than 18 years of age at the time of death. Due to the poor preservation, sex of the individual could not be determined. Enamel hypoplasia was present in the form of a

transverse groove on the labial surface of the maxillary left I2. Dental measurements were recorded. Postcranial measurements were limited to the left upper limb.

CA-CCO-696 - SOUTH LOCUS

The remains of a minimum of 169 individuals were recovered from the South Locus of CCO-696. All of the burials were contained in the Vaqueros paleosol.

Repeated interment of burials in the central portion of the locus resulted in the disturbance of many of the older burials. In some cases, burials assigned a single number were found to include skeletal elements representing more than one individual. In these instances, each additional individual was given a letter designation. For example, Burial 38 was found to contain elements of three individuals, assigned Burials 38, 38A, and 38B. Several isolated skeletal elements were also recovered, but were not considered to represent additional individuals and have not been included in the total burial count.

The burial population was made up of:

adults = 130
probable adults = 3
adolescents = 11
adolescent/adults = 7
juveniles = 11
juvenile/adolescent = 1
infants = 5
infant/juvenile = 1

For nearly half of the burials (82), no sex determination could be made. Sex assignments for the remainder of the population were as follows:

females = 13
probable females = 21
possible females = 12
males = 20
probable males = 14
possible males = 7

A total of 62 burials (37%) from the South Locus of CCO-696 were associated with artifacts.

Burial 1

Burial 1 represented an adult probable female over the age of 35 years at the time of death. This burial was located at a bearing of N68 E at a distance of 11.7 m from Datum A. The burial was at a depth of 70 cm below Datum A in the Vaqueros paleosol. This individual was in a ventrally extended position, facing down. This primary inhumation was oriented 342° from magnetic north.

Burial 1 was heavily disturbed by rodents and missing the pelvic girdle and most leg and foot bones. Age was determined based on complete epiphyseal union, dental eruption, endocranial suture closure and heavy to extreme dental wear. The sex determination was based on the overall gracility of the skeleton and an elongated thin notch between the anterior superior and anterior inferior iliac spines. Pathologies included osteophytic lipping on the articular surfaces of the proximal humerus, patella, and left cuboid as well as between the intermediate and distal phalanges of the hand. Dental pathologies included hypoplasia, resorption of alveolar processes, and periodontal disease. There was an anomalous small hole (approximately 2 mm) in the radial tuberosity at the insertion of biceps brachii. Nonmetric traits noted were a septal aperture in the distal humerus, multiple superorbital foramina, and a mildly bilaterally pointed chin. Cranial and dental measurements were taken for this burial.

Burial 2

Burial 2 represented an adult probable male past the age of 40 years at the time of death. This burial was located at a bearing of N46°W at a distance of 8.3 m from Datum A. The burial was at a depth of 117-133 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on his left side, facing north. The left arm was lifted toward the cranium, possibly with fingers in the mouth. This burial was a primary interment oriented 257° from magnetic north.

Burial 2 was highly decomposed with most elements present in fragmentary condition. The age of this individual was determined by complete epiphyseal union and dental eruption, endocranial suture closure, and extreme dental wear. The sex was based on the overall robusticity of the skeleton, rugose supraorbital tori, and a moderately sized mastoid. Pathologies included extreme dental wear and slight horizontal striations on the right maxillary first incisor. Anomalous enamel extensions were noted on all mandibular molars. Nonmetric traits included a persistent metopic suture evident in the glabellar region only and a laterally spurred supraorbital notch. Postcranial measurements were taken for this burial.

Burial 3

Burial 3 represented an adult male aged between 21 and 26 years at the time of death. This burial was located at a bearing of N20 E at a distance of 5.7 m from Datum A. The burial was at a depth of 121 cm from the Datum A plane within the Vaqueros paleosol. The individual was in a tight dorsal flex position with the legs to the left side. The cranium laid on its right side, facing south. The burial was a primary interment oriented 344° from magnetic north.

The condition of the burial is poor with most elements present in highly fragmented condition. Age was determined by complete dental eruption, epiphyseal union, endocranial suture closure, and moderate dental wear. The sex was based on the general robusticity of the skeleton, moderate to large brow ridges, sloping forehead, strongly demarcated temporal line, and everted gonial angles of the mandible. Faint horizontal striations appeared on anterior maxillary teeth. Anomalous enamel extensions were noted on the buccal surface of the left maxillary third molar. Extreme crowding of maxillary and mandibular anterior teeth produced rotation in several incisors. Nonmetric traits observed were a metopic suture persistent only at glabella, supraorbital tori with a notch on the right and a single foramen on the left, and a bilaterally pointed chin form. Dental and post cranial measurements were taken for this burial.

Burial 4

Burial 4 represented an adult possible female aged over 30 years at the time of death. This burial was located at a bearing of N33°W at a distance of 7.8 m from Datum A. The burial was at a depth of 109-124 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing southeast. This primary inhumation was oriented 192° from magnetic north.

Burial 4 was in highly fragmented and decomposed condition. Rodent gnawing was evident on several long bone shafts. Portions of the cranium and most long bones survived. Age determination was based on complete dental eruption, epiphyseal union, heavy dental wear and endocranial suture closure. The sex of the individual was based on the overall gracility of the skeleton and lack of prominence of the superciliary arches. Osteophytic growth was noted on the distal end of a foot phalanx. The cranium was too fragmentary to score nonmetric traits. Dental and postcranial measurements were taken for this burial.

Burial 5

This burial represents an adult of indeterminate sex over the age of 18 at the time of death. Burial 5 was located at a bearing of N70°W at a distance of 2.4 m from Datum A. The burial was at a depth of 86-106 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on its right side facing east. The orientation of the body was at 220° from magnetic north in a primary inhumation.

Burial 5 was highly fragmentary and decomposed, leaving primarily the teeth and long-bone shafts of the arms and legs. The age was based on the presence of a fully erupted third molar and the overall adult size of the bones. The sex of this individual could not be determined. The dentition of Burial 5 showed strong hypoplastic

grooves on the canines and premolars and mild hypoplasia on the incisors. Dental measurements were taken for this burial.

Burial 6

Burial 6 represented an adult probable male over the age of 26 years at the time of death. This burial was located in excavation unit S3/W2. This burial was at a depth of 85-100 cm below Datum A within the Vaqueros paleosol. This individual was in a tight dorsal flex with the left side of the head down, facing northwest. The cranium of Burial 6 rested on the pelvic girdle of Burial 7. Burial 6 was a primary inhumation oriented 218° from magnetic north.

Burial 6 was highly fragmented with almost no lower body. The age of this individual was established by complete dental eruption, moderate dental wear, and endocranial suture closure. The sex was determined to be male based on a rugose, thick mandibular symphysis, a square dental arcade, and a moderately prominent supraorbital torus. Mild transverse grooves on the right maxillary canine indicated probable hypoplasia. An enamel extension on the buccal surface of the right mandibular second molar was noted. Nonmetric traits included multiple supraorbital foramina, multiple zygomatic foramina, and a bilaterally pointed chin form. Dental measurements were taken for this burial.

Burial 7

Burial 7 represented an adult female over the age of 35 years at the time of death. This burial was located at a bearing of S58°W at a distance of 3.4 m from Datum A. The burial was at a depth of 99-115 cm below Datum A in the Vaqueros paleosol. Burial position was a tight flex on the right side, facing east. This primary inhumation was oriented 186° from magnetic north.

Burial 7 was highly fragmented and badly decomposed, although most elements were represented. Age determination was based on complete epiphyseal union, dental eruption, endocranial suture closure, and extreme dental wear. The sex of this individual was based on measurement of the anterior and posterior chords of the sciatic notch. The determination of female was corroborated by the slight prominence of the superciliary arches, moderate to gracile mandibular symphysis, and overall gracile skeletal elements. This individual had a remarkably thick cranial vault, especially in the parietal region. Dental pathologies present were extreme wear and carious lesion.. Dental anomalies included enamel pearls and buccal enamel extensions in the molars. Postcranial pathologies included osteoarthritis found on joint surfaces of both the right talus and calcaneus. The only nonmetric trait observed was probable multiple supraorbital foramina. Dental, cranial, and postcranial measurements were taken for this burial.

A wood charcoal sample collected from the burial matrix produced a radiocarbon date of 1450 +/-70 B.P. (Beta-93709), or 1320 cal B.P.

Burial 8

This burial represented an adult male over the age of 18 at the time of death. This burial was located at a bearing of N88 E at a distance of 24.8 m from Datum A. The burial was at a depth of 127-142 cm below Datum A in the Vaqueros paleosol. The burial was placed partially into the B horizon. This individual was ventrally extended, face down, oriented 21° from magnetic north. The burial was a primary inhumation associated with Burials 9 (juvenile) and 11 (adult female, with fetus or neonate). Commingled portions of these burials were sorted in the lab.

The condition of Burial 8 was good although the right side of the skeleton was heavily rodent gnawed. Age determination was based on complete epiphyseal union, dental eruption, and moderate to heavy tooth wear. This individual's sex was based on the prominent superciliary arches, long mastoid, rugose mandibular gonial angle, rugose nuchal crest, and large acetabulum on the hipbone. Pathologies included a series of osteophytic growths and eburnation of facets in the cervical area of the vertebral column, lipping of the lumbar vertebrae, exaggerated bone spurs on first metatarsal's inferior surfaces, and dental hypoplasia. Anomalous enamel extensions were noted on the buccal surface of molars. This individual's stature was in the range of 164 to 169 cm as estimated from measurement of the radius, ulna and tibia. Nonmetric traits for Burial 8 included double supraor

bital foramina, ridged palatine torus, and a bilaterally pointed chin form. Dental and postcranial measurements were taken for this burial.

Burial 9

Burial 9 represented a prepubescent juvenile of indeterminate sex aged from 10-13 years at the time of death. This burial was located at a bearing of N85 E at a distance of 24.4 m from Datum A. The burial was at a depth of 112 to 136 cm below Datum A in the Vaqueros paleosol, inset into the B horizon. This individual was ventrally extended, face down. Burials 8 and 9 were commingled. The orientation of this primary internment was 340° from magnetic north.

Preservation of the burial was relatively poor, with portions of the right side of the upper body and cranium missing. Two adult individuals were separated in the lab from the juvenile that is Burial 9. The age of Burial 9 was based on the lack of pelvic fusion, dental eruption, and epiphyseal union of the long bones. The sex was indeterminate due to the young age of the individual. The right tibia and humerus show reactive tissue anomalies or trauma-induced bone resorption. Dental and postcranial measurements were taken for this burial.

Two extra adult individuals were found in association with Burial 9. One extra individual was a young adult of indeterminate sex represented by portions of a radius, phalanges, vertebrae, femur, tibia, and metatarsals. The other extra individual was an adult of indeterminate sex represented by portions of a radius, femur, and fibula.

Burial 10

Burial 10 represented an adult female aged between 44-50 years at the time of death. This burial was located at a bearing of N90 E at a distance of 25.7 m from Datum A. The burial was between the depths of 125 to 147 cm below Datum A in the Vaqueros paleosol. This primary interment was ventrally extended, face down, oriented 232° from magnetic north.

The condition of this burial was good with all elements in evidence. Age as an adult was based on complete epiphyseal union, dental eruption, pubic symphyseal face (Todd's phase IX) and moderate to extreme dental wear. The sex of the individual was based on a wide subpubic angle, female sciatic notch, lack of prominence of supraorbital tori, undefined temporal line, moderate mastoid size, and the width of the first sacral body equal to the width of the alae. There was bone resorption in the center of the left scapular glenoid fossa. Osteophytic lipping occurred throughout the lumbar and cervical sections of the vertebral column. Dental pathologies included calculus, caries, attrition of teeth and resorption of alveolar tissue. Anomalies included post auricular sulci (bilateral) and preauricular sulci (bilateral), pitting of the pubic symphysis, and pronounced arachnoid foveae on both parietals. Nonmetric traits observed included a wormian bone at lambda, multiple supraorbital notches and foramina, a single, double, and spurred hypoglossal canal, multiple mandibular foramina, and a bilaterally pointed chin form. Cranial, dental and postcranial measurements were taken for this burial.

Burial 11

This burial represents an adult female aged between 20-25 years along with a fetus or a neonate in or on the abdomen. This burial was located at a bearing of N86 E from Datum A. This burial was at a depth of 148.5 cm below Datum A resting at the interface between the A and B horizons of the Vaqueros paleosol. This primary inhumation was ventrally extended, face down, oriented 2° from magnetic north.

Burial 11 was in excellent condition with most elements represented. Age determination as an adult was based on complete epiphyseal union, dental eruption, and light wear on third molars as well as appearance of the pubic symphyseal face (Todd's phase II). Sex was determined by the sciatic notch, small acetabulum, light to moderate prominence of brow ridges, and overall gracility of the skeleton. Pathologies and anomalies included mild dental hypoplasia and a supernumerary peglike incisor. Nonmetric traits noted were a persistent metopic suture at glabella, double supraorbital foramina, multiple zygomatic foramina, occiput form bilateral mound, and a median point chin form. Most probable stature was 155 3.8 cm based on lengths of the radius, humerus, and femur. Cranial, dental, and postcranial measurements were taken for Burial 11.

Burial 12

Burial 12 represented a young adult probable female over the age of 18 at the time of death. This burial was located at a bearing of S60°W at a distance of 4.21 m from Datum A. The burial was at a depth of 102.5 to 115.5 cm below Datum A in the Vaqueros paleosol. The individual was in a tight flex position with the left side down, facing northwest. This primary inhumation was oriented 210° from magnetic north.

Burial 12 was fragmentary and poorly preserved. Age was based on complete epiphyseal union and dental eruption. Light wear on the third molars and moderate wear on the first molars indicated a youthful adult. The sex of Burial 12 was determined by a slight to moderate brow ridge prominence, gracile mandible, and a small femoral head diameter. Dental pathologies include a slight horizontal groove on the dental crown and hypercementosis. Anomalous enamel extensions were noted on mandibular molars on both lingual and buccal surfaces. Nonspecific periostisis was noted on the fibula. Nonmetric traits of multiple zygomatic foramen were noted. Dental and postcranial measurements were taken for this burial.

Burial 13

Burial 13 represented an adult of indeterminate sex over the age of 26 years at the time of death. This burial was located in excavation unit S6/W2. This burial was intertwined with Burial 14 located at a depth of 85-102 cm below Datum A in the Vaqueros paleosol. The relative positions and close association of these two burials indicate that their interment was a single event. Burial 14 was placed on top of Burial 13. Burial 13 was in a loose flex on the right side facing northwest. The orientation of this primary inhumation was 260° from magnetic north.

Burial 13 was very fragmentary, consisting of postcranial long bones that were poorly preserved. This burial was thought to be a male by the excavators, but lacked sexual markers upon analysis in the laboratory. The age determination was based on one completely fused distal radius and coronal endocranial suture closure indicating an age of 26-30 plus years. An anomalous articular surface of the distal radius with the lunate and scaphoid was noted. Postcranial measurements were taken.

Burial 14

Burial 14 represented an adult probable female aged between 26 and 31 years at the time of death. This burial was located in excavation unit S6/W2. The burial was at a depth of 93 cm below Datum A in the Vaqueros paleosol. The individual was in a loose flex on the left side, facing northeast. Burial 14 was commingled with Burial 13 in a related event. Burial 14 was placed on top of Burial 13. Burial 14 was a primary inhumation oriented 260° from magnetic north.

Burial 14 was fragmentary and poorly preserved. It included very little of the cranium, four teeth and portions of long bones. A molar belonging to another individual in the 10-14 year age range was included with Burials 13 and 14. The age of Burial 14 was based on complete epiphyseal union. Dental eruption, heavy to extreme dental wear, and endocranial suture closure. The sex determination was based on lack of prominence of the external occipital protuberance, mandible form, and overall gracility of the skeleton. No pathologies were noted. An anomalous dental root pearl was observed. A rounded chin form was the only significant nonmetric trait. Postcranial measurements were taken for this burial.

Four Spire-Lopped *Olivella* beads and a *Macoma* Disk bead were recovered from the matrix of Burial 14. One Spire-Lopped *Olivella* bead was found posterior to the lower lumbar vertebrae. Two of the Spire-Lopped *Olivella* beads and the *Macoma* Disk were recovered under the ribs in the thoracic area.

Burial 15

Burial 15 represented an adult possible female aged between 21 and 26 years at the time of death. This burial was located at a bearing of N41°W at a distance of 11 m from Datum A. The burial was at a depth of 84-95 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex on the left side, facing northwest. Burial 15 was a primary inhumation oriented 239° from magnetic north.

Burial 15 was very fragmentary and decomposed. The burial showed heavy rodent disturbance. Burial 15 consisted of the cranial vault, some teeth and long bones. The age determination was based on complete epiphyseal union, dental eruption, light anterior dental wear and moderate wear on molars and as well as beginning-

closed endocranial suture closure. The sex of the individual was based on the overall gracility of the skeleton. Faint horizontal striations were observed on many teeth. Anomalous molar roots were noted. Most nonmetrics were indeterminate. Dental and very few postcranial measurements were taken for this burial.

Burial 16

Burial 16 represented an adult of indeterminate sex aged between 25 and 30 years at the time of death. This burial was located at a bearing of S33°W at a distance of 4.1 m from Datum A. The burial was at a depth of 97-113 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position. Burial 16 was a primary inhumation oriented 227° from magnetic north.

Burial 16 was very fragmentary and badly decomposed. This burial consisted of portions of the skull, long bones, and carpals. The age of this individual was based on complete dental eruption, endocranial suture closure and dental wear. A mandibular first molar was recovered with Burial 16, but is clearly not from the same individual. Pathologies included a possible abscess inferior to the left mandibular premolars and light horizontal striations on the dental crowns. Anomalous dental enamel extensions were noted on molars. The only identified nonmetric trait was multiple zygomatic foramina. Dental measurements were taken for this burial.

Two bead fragments, 3 Spire-Lopped *Olivella* beads, an *Olivella* Saucer bead, and 5 *Macoma* Disk beads were recovered within the combined exposure matrix of Burial 16, 23, and 24. Two Saucer *Olivella* beads and a Spire-Lopped bead were found in the exposure matrix between Burials 23 and 16. The balance of the beads were scattered individually throughout the combined exposure matrix of Burials 16, 23, and 24.

Burial 17

Burial 17 represented an adult male over the age of 18 at the time of death. This burial was located at a bearing of S45 E at a distance of 10 m from Datum A. The burial was at a depth of 79 to 99.5 cm below Datum A in the Vaqueros paleosol. This individual was in a tight ventral flex, facing down. The head of Burial 17 appeared to be resting on the chest of Burial 20. Burial 17 was a primary inhumation oriented 128° from magnetic north.

This burial was in poor condition, with portions of most elements present. The age of the individual was based on complete dental eruption, moderate to extreme dental wear, and endocranial suture closure. The sex of this individual was based on pronounced superorbital tori, a robust mastoid, and extreme rugosity of leg elements. This individual has strong hypoplastic grooves, faint striations on the crown enamel and surface pitting on teeth. Anomalous buccal enamel extensions were observed on mandibular molars. No nonmetric traits were observed. Dental measurements were taken for this burial.

Burial 18

Burial 18 represented an adult of indeterminate sex over the age of 18 at the time of death. This burial was located at a bearing of N77°W at a distance of 3.75 m from Datum A. The burial was at a depth of 103-110 cm below Datum A in the Vaqueros paleosol. This individual was in a loose flex on the left side, facing northwest. Burial 18 was a primary inhumation oriented 210° from magnetic north.

Burial 18 was in such poor and fragmentary condition that field identification of the skeletal elements was used throughout the inventory. Most elements were represented. The age was determined by overall adult size of the elements and complete dental eruption. Sex was indeterminate. Dental wear was extreme; slight striations were noted, but no dental hypoplasia was assessed. The only nonmetric trait observed was a wormian bone in the lambdoid suture. Some postcranial measurements were taken for this burial.

One Spire-Lopped *Olivella* bead was recovered in the burial matrix of Burial 18.

Burial 19

Burial 19 represented an adolescent of indeterminate sex aged between 12 and 14 years at the time of death. This burial was located at a bearing of N42°W at a distance of 10.6 m from Datum A. The burial was at a depth of 80-98 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing approximately east. Burial 19 is located directly between Burial 15 and Burial 17. This primary inhumation was oriented 218° from magnetic north.

The condition of Burial 19 was very poor. The mandible and long bones were the primary elements present. The age of this juvenile/adolescent was based on an unfused manubrium and acetabulum, as well as dental eruption consistent with a 12-14 year old. Sex was not discernible due to the individual's young age. Dental hypoplasia was noted on anterior teeth. Dental measurements were taken.

Burial 20

Burial 20 represented a young adult female between the ages of 18 and 30 years at the time of death. This burial was located at a bearing of S40 E at a distance of 9.8 m from Datum A. The burial was at a depth of 86-101 cm below Datum A in the Vaqueros paleosol. Burial 20 was in a loose flex position on the left side, facing north. Burial 20 was commingled with Burial 17. This primary inhumation was oriented 272° from magnetic north.

The condition of Burial 20 was very poor, but most elements were represented. The age of this individual was based on epiphyseal union and presence of third molar with light wear. Dental hypoplasia was noted. An anomalous M3 and buccal enamel extensions were observed in the dentition. Nonmetric traits observed were multiple mandibular foramina and a bilateral point chin form. Dental and postcranial measurements were taken.

Burial 21

Burial 21 represented an adult of indeterminate sex over the age of 18 years at the time of death. This burial was located at a bearing of S84 E at a distance of 26.8 m from Datum A. The burial was at a depth of 130 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position. It could not be determined whether Burial 21 was a primary or secondary inhumation in question. The orientation of this burial could not be determined.

The condition of this burial was extremely poor. Extensive rodent gnaw marks were evident. The only elements present belonged to the left leg, right arm and a portion of mandible. The age of the individual was based on epiphyseal union and dental wear. Sex was indeterminate. No pathologies or anomalies were noted. No nonmetrics were possible. Dental and postcranial measurements were taken for this burial.

Burial 22

Burial 22 represented a juvenile of indeterminate sex aged between 8 and 12 years at the time of death. This burial was located at a bearing of S36 E at a distance of 9.8 m from Datum A. The burial was at a depth of 85-95 cm below Datum A in the Vaqueros paleosol. The individual was in a tight flex position on the right side. This primary inhumation was oriented 214° from magnetic north.

Burial 22 was in extremely poor and fragmentary condition. Leg and arm bones, teeth and portions of cranial vault were all that survived. The age was based on dental eruption and wear. Sex was unable to be determined on an individual of this age. Dental hypoplasia, slight grooves, and pitting were noted. No nonmetric traits were possible. Dental measurements were taken for this burial.

Burial 23

Burial 23 represented an adult, probable male, aged between 35 and 40 years at the time of death. This burial was located at a bearing of S29°W at a distance of 4.7 m from Datum A. The burial was at a depth of 97-113 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing east. This primary inhumation was oriented 222° from magnetic north.

This burial was in extremely poor condition. The elements present were long bones, teeth, and portions of the cranial vault. This individual's age was based on complete epiphyseal union, dental eruption, dental wear, and endocranial suture closure. The sex was based on a prominent external occipital protuberance. Both age and sex in this burial were only probable in that very few markers were present. No pathologies or anomalies were observed. No no-metric traits were possible. One dental measurement is available.

One Spire-Lopped *Olivella* bead was found near the cranium of Burial 23. Two *Olivella* bead fragments, 3 Spire-Lopped *Olivella* beads, an *Olivella* Saucer bead, and 5 *Macoma* Disk beads were recovered within the combined exposure matrix of Burial 16, 23, and 24. Two Saucer *Olivella* beads and a Spire-Lopped bead were

found in the exposure matrix between Burials 23 and 16. The balance of the beads were scattered individually throughout the combined exposure matrix of Burials 16, 23, and 24.

Burial 24

Burial 24 represented an adult of indeterminate sex over the age of 18 years at the time of death. This burial was located at a bearing of S32°W at a distance of 3.5 m from Datum A. The burial was at a depth of 101-111 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position. Burial 24 was probably a primary inhumation; its orientation was impossible to determine.

Burial 24 was in extremely poor condition. The elements present were long bones only. The age was determined by complete epiphyseal union and overall adult sized elements. The sex of this burial was indeterminate. No pathologies or anomalies were noted. No nonmetric traits were possible. No measurements were taken.

Two *Olivella* bead fragments, 3 Spire-Lopped *Olivella* beads, an *Olivella* Saucer bead, and 5 *Macoma* Disk beads were recovered within the combined exposure matrix of Burial 16, 23, and 24.

Burial 25

Burial 25 represented an adult of indeterminate sex over the age of 18 at the time of death. The burial was located at a bearing of S80 E at a distance of 3.6 m from Datum A. The burial was at a depth of 71 cm below Datum A in the Vaqueros paleosol. The position and orientation of this burial were indeterminate.

Burial 25 was in fragmentary condition with evidence of prior disturbance. The only elements present were the right tibia, femur, and temporal bone. The determination of age as an adult was based on the size of the femur. The sex of this individual was indeterminate. There were no pathologies noted. No nonmetric evaluation was possible. Few postcranial measurements were taken.

Burial 26

Burial 26 was an adult probable female who was 25-30 years of age at the time of death. This burial was located at a bearing of N82°W at a distance of 5.0 m from Datum A. The burial was situated 106 to 120 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, interred in a semi-extended position, on the right side, oriented 45° from magnetic north, with the head facing north.

The preservation of the remains was such that all skeletal sections of the individual were represented, albeit fragmented. Based on dental wear and ossification of the sternal end of the rib, the age of the individual was determined to be 25-30 years. Based on sciatic notch chord measurements, the depth of the preauricular sulcus, and the raised auricular surface, the sex was determined to be a probable female. An in-laboratory stature estimation based on the length of the right ulna indicated a height of 176.38 cm +/- 4.05 cm. Anterior compression and osteophytic lipping at the superior margin of the L1 centrum were present. Dental hypoplasia was noted on all canines. Enamel extensions appeared on the buccal sides of all mandibular molars and upper M2s. Dental and postcranial measurements were taken. A number of nonmetric cranial traits, including chin form and facial foramina were recorded.

A total of 11 Spire-lopped *Olivella* beads were found individually scattered in the burial matrix.

Burial 27

Burial 27 was an adult probable female who was 26-30 years of age at the time of death. This burial was located at a bearing of N30 E at a distance of 3.6 m from Datum A. The burial was situated 111 to 127 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. This was a primary inhumation, interred in a tight flex position, on the right side, oriented 224° from magnetic north, with the head facing down.

Although all skeletal sections except the shoulder girdle were represented, preservation was poor, with the remains being extremely fragmented. Based upon primarily dental wear and endocranial suture closure, the age of the individual was determined to be 26-30 years. Based upon skull gracility, the sex was determined to be a probable female. Dental pathologies were present in the form of slight enamel hypoplasia, and calculus buildup. Enamel extensions were also present for all maxillary molars. Some cranial and postcranial measurements were

recorded. Nonmetric traits were limited to the form of the occiput. An extra left mastoid belonging to another individual was found with Burial 27, but not given a separate burial number.

A shaped sandstone bowl mortar (95-8-8) was found inverted over the posterior portion of the cranium, and a shaped, sandstone, conical pestle (95-8-9) was found, partially covered by the mortar, along the left side of the interment. Two *Olivella* Saucer beads were recovered during burial exposure and 6 *Olivella* Saucer beads were found clustered in the thoracic area of the skeleton. A bear tarsal (95-8-287) found adjacent to the east side of the bowl mortar may be that of a Grizzly bear (*Ursus arctos*).

Burial 28

Burial 28 was an adult probable male who was 35-40 years of age at the time of death. This burial was located at a bearing of N83 E at a distance of 6.3 m from Datum A. The burial was situated 92 to 129 cm below Datum A, within the Vaqueros paleosol at the B horizon transition. This burial was a primary inhumation, interred in a loose flex position on the left side, oriented 264° from magnetic north, with the head facing north.

All skeletal sections except the inferior portions of the lower limbs were represented and were well preserved though fragmented. Based upon dental wear, and both endocranial and ectocranial suture closure, the individual was determined to be 35-40 years. Based on skull robustness and postcranial dimensions, the sex was determined to be a probable male. Pathologies included an abscess in the right maxilla, a healed fracture of the left radius, and severe osteophytic lipping of the lumbar vertebrae. Cranial and postcranial measurements were taken, and nonmetric cranial traits were recorded, including chin form, occiput form, and facial foramina. Additional cranial fragments found within krotovina east of the pelvic girdle of Burial 28 are duplicate portions of occipital squama, and were given the designation of Burial 28A in the laboratory.

Burial 28A

Burial 28A was an adult of indeterminate sex who was 26-31 years of age at the time of death. Burial 28A was noticed in the field as cranial fragments located within krotovina, and later identified in the laboratory from the Burial 28 matrix as a separate unassociated individual. The designation of Burial 28A was assigned in the laboratory.

The remains persisted as cranial fragments only. Based upon endocranial suture closure, the age of the individual was determined to be 26-31 years. Due to a lack of evidence, the sex of the individual could not be determined. No pathologies were noted, and no cranial measurements were recorded.

Burial 29

Burial 29 was an adult male who was 27-38 years of age at the time of death. This burial was located at a bearing of S33 E at a distance of 10.0 m from Datum A. The burial was situated 30-43 cm below Datum A, located in the Brentwood Alluvium. This individual appears to be a secondary inhumation, represented by a complete, yet fragmented cranium.

Based upon dental wear and endocranial suture closure, the age of the individual was determined to be 27-38 years. Based upon cranial robustness, the sex was determined to be a male. Dental pathologies and anomalies included maxillary abscesses on both sides, hypercementosis on maxillary molar roots, and enamel extensions. Cranial pathologies are limited to perimortem trauma present on the left supraorbital torus. Nonmetric cranial traits including occiput form and facial foramina were recorded.

Burial 30

Burial 30 was an adult male who was 22-26 years of age at the time of death. This burial was located at a bearing of S18°W at a distance of 4.6 m from Datum A. The burial was situated 95 to 109 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the left side, oriented 230° from magnetic north, with the head facing north.

All skeletal sections of the individual except the axial skeleton and inferior portions of the upper limbs were represented, though very fragmentary. Based upon epiphyseal union, dental wear, and endocranial suture closure, the age of the individual was determined to be 22-26 years. Based upon cranial and postcranial dimensions, the sex was determined to be male. Dental caries were present, as was dental hypoplasia. Enamel exten-

sions were also present on some mandibular and maxillary molars. Postcranial pathologies were limited to two cases of a distal foot phalanx being fused with an intermediate foot phalanx. Cranial, dental, and postcranial measurements were taken, although cranial nonmetric traits were not possible.

One quartz crystal (95-8-308) was recovered from the area posterior to the right scapula of Burial 30. Eleven Saucer *Olivella* beads, 20 Spire-Lopped *Olivella* beads, and 4 *Olivella* bead fragments were scattered throughout the burial matrix.

A sample of wood charcoal collected from the burial matrix, produced a radiocarbon date of 2350 +/- 80 B.P. (Beta-93710), or 2345 cal B.P.

Burial 31

Burial 31 was an adult who was 20-25 years of age at the time of death. Sex was indeterminate. This burial was located at a bearing of S60 E at a distance of 4.7 m from Datum A. The burial was situated 98 to 101 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 220° from magnetic north.

All skeletal sections of the individual were represented to some degree as extremely fragmented remains. Based upon epiphyseal union, and dental wear, the age of the individual was determined to be 20-25 years. The sex of the individual could not be deduced due to the fragmentary condition of the remains. Extremely light dental hypoplasia was noted. Dental and postcranial measurements were taken. No cranial nonmetric traits were recorded.

Three Spire-Lopped *Olivella* beads, and three *Olivella* bead fragments were recovered from the burial matrix.

Burial 32

Burial 32 was an adult of indeterminate sex who was 25-30 years of age at the time of death. This burial was located at a bearing of S78 E at a distance of 5.3 m from Datum A. The burial was situated 103 to 112 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 255° from magnetic north, with the head facing south.

The remains of this individual were poorly preserved, with all skeletal sections of the individual except the axial skeleton represented. The preserved sections were extremely fragmented. Based primarily upon dental wear, the age of the individual was determined to be 25-30 years. Due to the poor preservation, the sex of this individual was indeterminate. Anomalous heavily wear was present on the mandibular P4. Dental and postcranial measurements were taken. No nonmetric cranial traits were recorded.

One Split *Olivella* bead was found during burial exposure and 1 *Macoma* disk bead (95-8-22) was found in the burial matrix.

Burial 33

Burial 33 was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of S85 E at a distance of 4.6 m from Datum A. The burial was situated 102 to 118 cm below Datum A, within the Vaqueros paleosol. This individual represented a primary inhumation and was interred with Burial 58. Burial 33 was in a tight flex, on the left side, oriented 245° from magnetic north, with the head facing east.

Preserved remains represented all skeletal sections, although sparse and extremely fragmented. Based upon epiphyseal union and dental wear, the individual was determined to be an adult. Due to the poor preservation, sex could not be ascertained. No pathologies were noted. Some postcranial measurements were taken. Nonmetric cranial traits were not recorded due to poor preservation.

Twenty-eight *Macoma* Disk beads were recovered from atop the left femur midshaft in the thoracic/lumbar area of Burial 33.

Burial 34

Burial 34 was a juvenile of indeterminate sex who was 9-12 years of age at the time of death. This burial was located at a bearing of S55 E at a distance of 3.25 m from Datum A. The burial was situated 101 to 114 cm

below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a semi-extended position, on the left side, oriented 230° from magnetic north, with the cranium displaced.

The remains were poorly preserved. The shoulder girdle, and inferior portions of the upper and lower limbs were not present. Represented skeletal elements were incomplete and fragmentary. Based upon epiphyseal union, dental eruption, and dental wear, the age of the individual was determined to be 9-12 years. Due to the age of the individual, sex could not be determined. Dental anomalies included a slight groove at the cervicoenamel junction, and the presence of an enamel extension on the left mandibular M2. Dental measurements were recorded. Additional teeth and lower-limb elements belonging to at least two adult individuals were found in the laboratory with Burial 34, but were not assigned a separate burial number.

Individual Split and Saucer *Olivella* beads, and a single *Macoma* disk bead were recovered during burial exposure. A mixed lot of 6 Saucer, 53 Spire-Lopped, and 9 Split *Olivella* beads and 4 *Olivella* bead fragments was recovered from the cranial and shoulder girdle areas.

Burial 35

Burial 35 was an adult of indeterminate sex who was 18-21 years of age at the time of death. This burial was located at a bearing of S75 E at a distance of 2.7 m from Datum A. The burial was situated 110 to 117 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, in a tight flex on the left side, oriented 220° from magnetic north.

Skeletal sections not represented were the skull, and shoulder girdle. All skeletal sections represented were incomplete and very fragmented. Based upon epiphyseal union, and the degree of metamorphosis of the right pubic symphyseal face, the age of the individual was concluded to be 18-21 years. Due to the fragmentary condition of the remains, the sex of this individual could not be determined. No pathologies nor cranial nonmetric traits were recorded, although some postcranial measurements were recorded.

Two Saucer *Olivella* beads were recovered from the burial matrix. Two *Haliotis* Ornaments (95-8-42,43), and one *Haliotis* fragment (95-8-47) were recovered from the left elbow area of Burial 35.

A total of 32*Olivella* Split beads, 48 Saucer beads, 57 Spire-lopped *Olivella* beads, and 4 *Olivella* bead fragments were recovered from the matrix, during the exposure of Burial 35, and Burial 36.

Burial 36

Burial 36 was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of N90 E at a distance of 2.1 m from Datum A. This burial was situated 102 to 119 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, positioned in a tight ventral flex, oriented 210° from magnetic north, with the head facing east.

All skeletal sections were represented by incomplete, fragmentary remains. Based upon epiphyseal union, and dental wear, the individual was determined to be an adult. Sex was indeterminate. Dental pathologies are marked by the presence of hypoplasia, hypercementosis, and a carious lesion. Dental anomalies included extreme maxillary incisor shoveling, a supernumerary tooth, and enamel extensions on two maxillary molars. Dental and postcranial measurements were taken. Cranial nonmetric traits were not possible due to the poor preservation of the individual.

Two Split beads, 2 Saucer beads, 4 Spire-lopped *Olivella* beads, and 1 *Olivella* fragment were recovered from the burial matrix of Burial 36.

A total of 32 Split beads, 48 Saucer beads, 57 Spire-lopped *Olivella* beads and 4 *Olivella* bead fragments were recovered from the matrix, during the exposure of Burial 35, and Burial 36.

Burial 37

Burial 37 was an adult of indeterminate sex who was 18-25 years of age at the time of death. This burial was located at a bearing of N85 E at a distance of 1.9 m from Datum A. The burial was situated 108 to 119 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a loose flex position, on the right side, oriented 127° from magnetic north, with the head facing north.

The preservation of the remains was poor, with all elements extremely fragmented. The remains of the shoulder girdle, axial skeleton, and the pelvic girdle were identified in the field. Based upon dental eruption and

wear, the age of the individual was determined to be 18-25 years. Due to the poor state of preservation, sex determination for the individual was not possible. Dental hypoplasia was present on maxillary and mandibular teeth, and enamel extensions were present on the buccal surfaces of all mandibular molars. Also, a circular groove was present at the cervico-enamel junction of the left mandibular M3. Dental measurements were taken on all teeth present. Nonmetric cranial traits were not recorded due to the poor preservation of the individual.

A total of 5 Spire-Lopped *Olivella* beads, and 118 Split *Olivella* beads were found with Burial 37. The majority of the beads were found in the areas of the right radius, and left ulna, with 8 being recovered from the burial matrix. The Split beads that were located with the arm bones were found organized with the ventral surface of one bead resting on the dorsal surface of another, indicating that the beads were probably strung.

Burial 38

Burial 38 was recorded in the field as an infant of indeterminate sex who was 12-18 months of age at the time of death. In the laboratory, the remains of Burial 38 were found to represent a total of three individuals. All were located at a bearing of S16°W at a distance of 3.9 m from Datum A. The individuals were situated at 87 to 107 cm below Datum A, in the Vaqueros paleosol.

Because Burial 38, Burial 38A, and Burial 38B were commingled, orientation of the individuals could not be determined. For Burial 38, most general skeletal sections were represented by (at least) single fragments. The pelvic girdle, the superior portions of the upper limbs, and the inferior portions of the lower limbs were not represented. Based upon dental eruption and wear, the age of the individual was determined to be 12-18 months. Due to a lack of diagnostic elements and the young age of the individual, sex was indeterminate. No pathologies were noted. Dental measurements were taken.

Burial 38A

Burial 38A is represented by portions of the skull, axial skeleton, upper limbs, and lower limbs. The remains were very fragmented, some in the form of individual diaphyseal elements. Based upon dental eruption, the age of the individual was determined to be 8-10 years. Due to the lack of diagnostic elements and the young age of the individual, sex was indeterminate. Although no formal pathologies were noted, light horizontal striations were noticed on the labial surfaces of some maxillary incisors. Dental measurements were recorded.

Burial 38B

Burial 38B is represented by portions of the skull, axial skeleton, inferior portion of the upper limbs, and the lower limbs. The remains were very fragmented. Based upon dental eruption, and dental wear, the age of the individual was determined to be 10-12 years. Due to the lack of diagnostic elements and the young age of the individual, sex was indeterminate. Although no formal pathologies were noted, light horizontal striations were noticed on the labial surface of the mandibular canine. Dental measurements were recorded.

Burial 39

Burial 39 was an adolescent of indeterminate sex who was 15-17 years of age at the time of death. This burial was located at a bearing of S5°W at a distance of 4.6 m from Datum A. The burial was situated 93 to 101 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation and was interred above Burial 59, Burial 60, and Burial 61. Burial 39 was placed in a tight ventral flex position, oriented 210° from magnetic north, with the head facing down.

The preservation of the remains was very poor with portions of the skull, the superior portions of upper limbs, and the lower limbs in extremely fragmented condition. Based upon epiphyseal union, dental eruption, and dental wear, the age of the individual was determined to be 15-17 years. The sex of the individual was indeterminate. No formal pathologies were noted, although an enamel extension was present on the lingual side of the right mandibular M1. Slight striations, and slight anterior surface pitting was noted as being present on some anterior teeth. Dental measurements were recorded.

Four Spire-Lopped *Olivella* beads were recovered from the burial exposure matrix, but were not considered to be direct associations.

Burial 40

Burial 40 was an adult of indeterminate sex who was 26+ years of age at the time of death. This burial was located at a bearing of S22 E at a distance of 3.4 m from Datum A. The burial was situated 105 to 114 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position on the left side, oriented 80° from magnetic north, with the head facing south.

All major skeletal sections were represented by fragmented and incomplete elements. Based upon epiphyseal union, dental wear, and endocranial suture closure, the age of the individual was determined to be 26-30+ years. Due to the moderate dimensions of the very fragmented remains, the sex of the individual could not be determined. Dental pathologies included hypercementosis on all teeth, and calculus buildup on all molars. Also, an anomalous additional root was present on the buccal side of the right mandibular M2. Both dental, and postcranial measurements were recorded. Additional teeth and portions of foot phalanges belonging to at least two other individuals were identified in the laboratory, but were not given separate burial numbers.

Five Spire-Lopped *Olivella* beads were recovered during burial exposure.

Burial 41

Burial 41 was an adult of indeterminate sex who was 35+ years of age at the time of death. This burial was located at a bearing of S14 E at a distance of 4.6 m from Datum A. The burial was situated 89 to 114 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation. The position and orientation of Burial 41 could not be determined.

Although all areas except the shoulder and pelvic girdles were represented, the remains were extremely fragmented. Based on dental wear, the age of the individual was determined to be 35+ years. Due to the extremely fragmented state of the remains, the sex of the individual could not be determined. Pathologies included osteoarthritic degenerative change occurring on the left metatarsal, and calculus buildup on all molars present. Dental and postcranial measurements were recorded. An additional left maxillary P3 belonging to another individual was found with Burial 41. This tooth was not given a separate burial number.

Twenty *Olivella* Spire-Lopped and two *Olivella* Saucer beads, along with 3 *Olivella* bead fragments were recovered from the area of the pelvic girdle.

Burial 42

Burial 42 was an adult of indeterminate sex who was 30+ years of age at the time of death. This burial was located at a bearing of S22°W at a distance of 5.9 m from Datum A. The burial was situated 89 to 103 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight ventrally flexed position, oriented 246° from magnetic north, with the head facing down.

All skeletal sections except the shoulder girdle and axial skeleton were represented, albeit fragmented. Based upon dental wear, and endocranial suture closure, the age of the individual was determined to be 30-35+ years. Due to the extremely fragmented remains, the sex of the individual could not be determined. Mild osteophytic lipping was present on the proximal right 1st phalanx. Dental hypoplasia was present as slight labial surface pitting of the mandibular canines. Dental anomalies included a third root on the lingual surface of the mandibular M2, and possible special use wear. Both dental and postcranial measurements were recorded.

One *Olivella* Saucer, 2 *Olivella* Spilt beads, and 2 *Olivella* bead fragments were recovered during burial exposure.

Burial 43

Burial 43 was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of S0°W at a distance of 5.5 m from Datum A. The burial was situated 89 to 107 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight ventral flex, oriented 240° from magnetic north, with the head facing southwest.

The remains of the individual were highly decomposed and extremely fragmented. Although all skeletal sections were represented in the field, most bones were indistinguishable in the laboratory due to decomposition. Based on dental eruption and dental wear, the age of the individual was determined to be an adult. Due to the poor preservation of the remains, sex determination was not possible. An anomalous right maxillary M3 was

present that had a short bulbous root with hypercementosis, and a crown that had a deep central depression. Dental measurements were limited to the anomalous M3. Postcranial measurements were limited to the left radius, and portions of both femora.

Three *Olivella* Spire-Lopped beads were recovered from the burial matrix.

Burial 44

Burial 44 was an adult of indeterminate sex who was 25-30 years of age at the time of death. This burial was located at a bearing of S45 E at a distance of 6.4 m from Datum A. The burial was situated 100 to 111 cm below Datum A, in the B horizon transition of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position on the right side, oriented 218° from magnetic north, with the head facing west. Hand phalanges were found in the mouth.

The preservation of the remains was very poor. Although all skeletal sections are represented, many were only distinguishable in the field. Based on dental eruption and dental wear, the age of the individual was determined to be 25-30 years. Due to the poor preservation of the remains, sex determination was not possible. Dental hypoplasia was present on all canines, and hypercementosis was present on all maxillary teeth except the M3's. Dental, postcranial, and mandibular measurements were recorded. Seven heavily worn teeth belonging to another individual were found in the laboratory, associated with Burial 44, but were not given a separate burial number.

Burial 45

Burial 45 was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of N25 E at a distance of 3.5 m from Datum A. The burial was situated 104 to 115 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 202° from magnetic north, with the head facing east.

The burial was extremely fragmented. All skeletal sections except the shoulder girdle, were represented. The siding of most elements was only possible in the field. Based on dental wear, the individual was determined to be an adult. Due to the poor preservation of the remains, sex of the individual could not be determined. The left triquetral had an osteoarthritic pathology on its margins. Dental hypoplasia was present on the left maxillary M1, and there was a slight circular groove around the neck of the right mandibular P4. A small spur was present on the mesial aspect of the root surface of the left mandibular M1, and there was an enamel extension on the buccal side of the right mandibular M2. A groove was noted on the mesial portion of the occlusal surface of the left maxillary M3 representing possible special use wear. A number of dental measurements were recorded.

Five *Macoma* Disk beads were recovered from the burial matrix.

Burial 46

Burial 46 was an adult of indeterminate sex who was 20+ years of age at the time of death. This burial was located at a bearing of S14 E at a distance of 6.3 m from Datum A. The burial was situated 88 to 99 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 220° from magnetic north, with the head facing east.

The shoulder girdle, axial skeleton, and pelvic girdle were not present. All elements were extremely fragmentary. Based on the complete epiphyseal union of the distal portion of the right femur, the age of the individual was determined to be 20+ years. Due to the poor preservation of the remains, the sex of the individual could not be determined. Slight osteophytic lipping was present on the proximal end of a proximal phalanx of the first toe. A number of postcranial measurements were recorded.

One *Olivella* Saucer and 3 *Olivella* Spire-Lopped beads, along with 2 *Olivella* bead fragments, were found in the superior area of the right humerus.

Burial 47

Burial 47 was an adult of indeterminate sex who was 22-30 years of age at the time of death. This burial was located at a bearing of S10 E at a distance of 5.4 m from Datum A. The burial was situated 94 to 102 cm

below Datum A, at the B horizon transition of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 240° from magnetic north, with the head facing south.

The pelvic girdle was not present. The shoulder girdle, and remaining axial skeleton persisted only as small indeterminate fragments. All other skeletal sections, were incomplete, and extremely fragmented. Based on the epiphyseal union of the left distal tibia, dental eruption, and dental wear, the age of the individual was determined to be 22-30 years old. Due to the poor preservation of the remains, the sex of the individual could not be determined. Dental hypoplasia and hypercementosis was present on a number of both mandibular and maxillary teeth. Enamel extensions were present on the buccal sides of some mandibular and maxillary molars. Slight grooves around the necks of some mandibular and maxillary teeth, were present. Dental measurements and some postcranial measurements were recorded.

Burial 48

Burial 48 was an adult of indeterminate sex who was 20+ years of age at the time of death. This burial was located at a bearing of S25 E at a distance of 7.5 m from Datum A. The burial was situated 92 to 106 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight, ventrally flexed position, oriented 212° from magnetic north, with the head facing east.

All skeletal sections except the cranium were represented in fragmentary condition. Based on epiphyseal union of a portion of the iliac crest, dental eruption, dental wear, and ossification of the sternal end of the rib, the age of the individual was determined to be 20-25+ years. The sex of the individual could not be determined. Slight striations and surface pitting was evident on the right maxillary I1, and hypercementosis was present on the roots of the right maxillary canine, P3, and P4. All mandibular incisors had heavy lingual wear, with enamel removed from the neck area lingually. Some dental and postcranial measurements were recorded.

One *Olivella* Saucer and 7 Spire-Lopped beads were collected from near the pelvic girdle and a quartz crystal (95-8-329) was recovered from the burial exposure matrix.

A sample of charred wood collected from the burial matrix produced a radiocarbon date of 1730 +/- 80 B.P. (Beta-93711), or 1610 cal B.P.

Burial 49

Burial 49 was an adult of indeterminate sex who was 22-30 years of age at the time of death. This burial was located at a bearing of S5 E at a distance of 7.9 m from Datum A. The burial was situated 84 to 98 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 250° from magnetic north, with the head facing east. Burial 48 was partially above Burial 62.

The preservation of the remains was very poor. Although all skeletal portions were represented, they were very fragmented and incomplete. Based on dental eruption and dental wear, the age of the individual was determined to be 22-30 years. Due to poor preservation the sex of the individual could not be determined. Hypercementosis was present for the left maxillary M3. Dental caries were present on the occlusal surface of the left maxillary M3, and on both the occlusal surface and at the cervicoenamel junction of the right maxillary M3. Slight buccal surface pitting was also present on the maxillary left I2. Dental measurements for the right and left maxillary M2s, and M3s were recorded.

Burial 50

Burial 50 was an adult possible female who was 18-23 years of age at the time of death. This burial was located at a bearing of S15 E at a distance of 10.5 m from Datum A. The burial was situated 90 to 98 cm below Datum A, within the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, and due to the lack of axial skeleton, the orientation could not be ascertained.

The preservation of the remains was poor, with only portions of the pelvic girdle, upper limbs, lower limbs, and piece of right scapular process persisting. Based on a portion of newly fused right iliac spine, the age of the individual was determined to be 18-23 years. Based upon the small cross section dimensions of the humeral shaft, and the midshaft of the left femur, the sex of the individual was determined to be a possible

female. No pathologies were noted, and postcranial measurements recorded were limited to the midshaft of the left femur.

Burial 51

Burial 51 represented an adult of indeterminate sex aged between 22 and 30 years at the time of death. This burial was located at a bearing of S20 E at a distance of 5.45 m from Datum A. The burial was at a depth of 85 to 97 cm below Datum A in the Vaqueros paleosol. This individual was in a tight ventral flex position, facing down. This primary inhumation was oriented 360° from magnetic north.

Burial 51 was in deteriorated condition. The elements were identified in the field as they were too fragmentary for further analysis. The age of the individual was based on dental wear and endocranial suture closure. The sex was indeterminate. Dental hypercementosis was noted. Nonmetric traits included the absence of a supraorbital notch or foramen on the right torus and the presence of a single foramen on the left. No measurements were possible.

Burial 52

Burial 52 represented an adult male aged between 30 and 35 years at the time of death. This burial was located at a bearing of S0°W at a distance of 10.2 m from Datum A. The burial was at a depth of 93-106 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing northeast. This primary inhumation was oriented 148° from magnetic north.

The condition of Burial 52 was good with most elements represented. The age of this individual was based on complete epiphyseal union, dental eruption, dental wear, and endocranial suture closure. The sex was based on a prominent supraorbital torus, everted gonial angle, and overall robusticity of the skeleton. Osteophytic lipping was noted on the bodies and articular facets of cervical vertebrae. This process was evident to a lesser extent on the thoracic vertebrae. The calcaneus and talus also exhibited osteoarthritis as well as extensive spurring of the distal plantar aspect of the first metatarsal. An anomalous facet was present on the right patella indicating a strong attachment of the vastus medialis muscle. A dental anomaly of lingual enamel extension was noted. Nonmetric traits included a single supraorbital foramen, and an absence of a mental foramen on the mandible. Cranial, dental and postcranial measurements were taken for this burial.

Burial 53

Burial 53 represented an adult male over the age of 42 years at the time of death. This burial was located at a bearing of S5°W at a distance of 11.9 m from Datum A. The burial was at a depth of 77-89 cm below Datum A in the Vaqueros paleosol. This individual was in a loose flex position on the left side, facing west. This primary inhumation was oriented 148° from magnetic north.

Burial 53 was in fair t° poor condition. Most elements except the axial skeleton were present. The age of the individual was based on complete dental eruption, dental wear, and endocranial suture closure. Sex determination was based on an elongated mastoid process, a rugose gonial angle, and overall robusticity of the skeleton. Pathologies included resorption of the alveolus and slight lineal pitting or grooving in the crown of a molar. Anomalies included an auditory exostosis on the left and unusual dental wear in the molar region. Nonmetric traits included a metopic suture persistent only at glabella, nonsymmetrical notch and foramina on the supraorbital torus, and a mastoidal foramen exsutural on the temporal bone. Dental, cranial, and postcranial measurements were taken.

One *Olivella* bead fragment, 36 Spire-Lopped *Olivella* beads, and 84 Saucer *Olivella* beads were recovered in the burial matrix of Burial 53. Eleven Spire-Lopped beads and 38 Saucer beads were found around the neck, face, and right shoulder. One Saucer bead was recovered adjacent to the right humerus

Burial 54

Burial 54 represented an adult male aged between 28 and 33 years at the time of death. This burial was located at a bearing of N85 E at a distance of 2.62 m from Datum A. The burial was at a depth of 103-119 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing northwest. This primary inhumation was oriented 230° from magnetic north.

Burial 54 was in fair condition with most elements present. The age of the individual was based on epiphyseal union, dental eruption, dental wear, and endocranial suture closure. The sex was based on the presence of a very large mastoid, rugose gonial angle, and overall robusticity of the skeleton. Pathologies included dental caries and resorption of the alveolus in the mandibular molar region, and slight pitting on left maxillary dental crowns. Nonmetric traits observed were a ridged palatine torus, multiple mandibular foramina, and a bilaterally pointed chin form. Dental, cranial, and postcranial measurements were taken for this burial.

Burial 55

Burial 55 represented an adult of indeterminate sex aged between 24 and 29 years at the time of death. This burial was located at a bearing of S65 E at a distance of 4.0 m from Datum A. The burial was at a depth of 115-132 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, possibly facing east. Unfused hand phalanges were found with this burial indicating another individual of a different age was present. Burial 55 was a primary inhumation oriented 230° from magnetic north.

Burial 55 was in poor condition with most elements present in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, extreme dental wear and endocranial suture closure. The determination of sex was based on the gracility of the overall skeleton. No pathologies or anomalies were noted. Postcranial measurements were taken for this burial.

Four *Olivella* Spire-Lopped beads, 1 *Olivella* Split-Bead bead and 1 *Olivella* Saucer bead were found scattered throughout the burial matrix of Burial 55.

Burial 56

Burial 56 represented an adult possible male over the age of 18 at the time of death. This burial was located at a bearing of S85 E at a distance of 5.4 m from Datum A. The burial was at a depth of 104 to 114 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex on the right side, facing southeast. The right hand was found on the right side of the face. This primary inhumation was oriented 250° from magnetic north.

Burial 56 was in extremely poor condition with most elements present in fragmentary condition. The age of the individual was based on complete dental eruption and heavy to extreme dental wear. The determination of sex was based on a large everted gonial angle and rugose mandibular body at the symphysis. Pathologies included dental caries, resorption of the alveolus in the right mandibular molar region, osteoarthritic spurs on distal phalanges and extensive dental hypoplasia. Anomalous dental enamel extensions were noted on the buccal aspect of the right maxillary second molar. Rudimentary root spurs were identified on a maxillary third molar. The only observed nonmetric trait was multiple mandibular foramina. Dental measurements were taken for this burial.

One *Olivella* Spire-Lopped bead was recovered from the burial matrix of Burial 56.

Burial 57

Burial 57 represented a adult of indeterminate sex aged between 17 and 22 years at the time of death. This burial was located at a bearing of S68 E at a distance of 3.4 m from Datum A. The burial was at a depth of 101 to 114 cm below Datum A in the Vaqueros paleosol. This individual was in a tight ventral flex position, facing down. Burial 57 was a primary inhumation oriented 225° from magnetic north.

Burial 57 was in poor condition with most elements except the axial skeleton present in fragmentary condition. The age of the individual was based on complete dental eruption and light dental wear. The sex was indeterminate. Pathologies included slight transverse grooves on the crowns of the anterior teeth. Anomalous buccal enamel extensions were noted on both the maxillary and mandibular molars. No nonmetric traits were observed. Dental and postcranial measurements were taken for this burial.

Two *Haliotis* ornaments (95-8-88a and b), 14 *Ollivella* Spire-Lopped beads, 5 *Olivella* Split-Bead, 120 *Olivella* Saucer beads, and a shaped sandstone mortar (95-8-89) were recovered from the burial matrix of Burial 57. The bowl-shaped morter was inverted over the pelvic region of the individual. *Olivella* beads were found associated with the ulna and radius of the left arm. One *Haliotis* ornament was located at the left knee, which was pulled up to the left elbow due to the tight flex position of the body.

Burial 58

Burial 58 represented an adult male over the age of 35 years at the time of death. This burial was located at a bearing of N90 E at a distance of 4.2 m from Datum A. The burial was at a depth of 122 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing northwest. Another individual's tooth crown, a right mandibular canine exhibiting dental hypoplasia, was found with the remains of Burial 58. This primary inhumation was oriented 245° from magnetic north.

Burial 58 was in very poor condition with most elements present in fragmentary condition. The age of the individual was based on complete dental eruption, extreme dental wear and endocranial suture closure. The determination of sex was based on pronounced supraorbital tori, vertically pronounced mandibular height at the ascending ramus, robust mandibular symphysis, posterior chord of the sciatic notch smaller than the anterior chord, and general robusticity of the overall skeleton. Pathologies included resorption of alveolus in both maxilla and mandible, dental hypercementosis, and irregular pitting of the crown enamel. Anomalous tooth wear was noted. Nonmetric traits observed were single zygomatic foramen and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Two *Olivella* Spire-Lopped beads and 3 *Macoma* Disk beads were recovered from the matrix of Burial 58.

Burial 59

Burial 59 represented an adult male aged between 24 and 28 years at the time of death. This burial was located at a bearing of S10°W at a distance of 4.15 m from Datum A. The burial was at a depth of 92-112 cm below Datum A in the Vaqueros paleosol. This individual was in a tight ventral flex position, facing down. The fingers of the right hand were inside the mouth. Burial 39 was positioned above Burial 57, a primary inhumation oriented 224° from magnetic north.

Burial 59 was in fair condition with most elements present in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, moderate dental wear and endocranial suture closure. The determination of sex was based on a pronounced superorbital torus, thick occipital fragments, a rugose and square gonial angle, and the general robusticity of the overall skeleton. Pathologies included possible compression of the thoracic and lumbar vertebrae, slight pitting and grooving on anterior teeth, and extreme labial wear on the premolars. Anomalies noted were a right maxillary supernumerary incisor and enamel extension on the buccal portion of mandibular molars. Nonmetric traits observed were a metopic suture persistent only at glabella, double supraorbital foramina (bilateral), and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Six *Olivella* Spire-Lopped beads were recovered in the burial matrix of Burial 59. One bead was found near the top of the cranium, one near the left scapula, and four near the right scapula.

Burial 60

Burial 60 represented an adult of indeterminate sex aged between 25 and 35 years at the time of death. This burial was located at a bearing of S2oE at a distance of 4.5 m from Datum A. The burial was at a depth of 93 to 114 cm below Datum A in the Vaqueros paleosol. This individual was in a extended ventral position, facing down. This burial was commingled with Burials 39 and 61. It was also very near Burial 59. This primary inhumation was oriented 72o from magnetic north.

Burial 60 was in poor condition with the absence of most of the cranium, axial skeleton, and pelvic girdle. Most elements present were in fragmentary condition. The age of the individual was based on complete dental eruption, dental root formation, and heavy to extreme dental wear. The sex was indeterminate. Pathologies included multiple transverse grooves on the labial surfaces of the anterior teeth, indicating dental hypoplasia. Anomalous dental enamel extensions were noted on the buccal aspect of maxillary and mandibular molars. No nonmetric traits were observed. Dental and postcranial measurements were taken for this burial.

Five bead fragments, 29 *Olivella* Spire-Lopped beads, and 61 *Olivella* Saucer beads were recovered from the matrix of Burial 60. Four *Olivella* Spire-Lopped beads were adjacent to the left proximal femur. Fifteen *Olivella* Saucer beads were found posterior to the occipital area of the cranium. The remainder of beads were scattered throughout the burial matrix.

Burial 61

Burial 61 represented an adult probable female aged between 20 and 24 years at the time of death. This burial was located at a bearing of S10°W at a distance of 4.95 m from Datum A. The burial was at a depth of 105 to 120 cm below Datum A in the Vaqueros paleosol. This individual was in a ventral position with the head on its right side. The flexure was indeterminate due to the lack of a lower body. Burial 61 was probably impacted by the inhumation of Burial 60. This primary interment was oriented 250° from magnetic north.

Burial 61 was in very poor condition with most elements present in fragmentary condition. The age of the individual was based on complete dental eruption, light dental wear, endocranial suture closure, and a pubic symphyseal face determined to be at Todd's Phase III. The determination of sex was based on the gracility of the overall skeleton small mastoids, the lack of a pronounced protuberance in the nuchal area, and the small non-robust mandible. Pathologies included a dental carie and irregular pitting on the labial surface of the canines. Anomalous enamel extensions were noted on the buccal aspect of mandibular molars. The only nonmetric trait observed was a mild auditory exostosis on the left side. Dental and postcranial measurements were taken for this burial.

Burial 62

Burial 62 represented an adult of indeterminate sex aged between 26 and 35 years at the time of death. This burial was located at a bearing of S25°E at a distance of 6.95 m from Datum A. The burial was at a depth of 95 to 115 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing southeast. Burial 62 was possibly disturbed by the interment of Burial 48. This primary inhumation was oriented 218° from magnetic north.

Burial 62 was in poor condition with most elements present in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, heavy to extreme dental wear and endocranial suture closure. Sex was indeterminate. No pathologies were noted. An anomalous supernumerary tooth was found between the right maxillary premolars. The only nonmetric trait noted was a median pointed chin form. Postcranial measurements were taken for this burial.

Burial 63

Burial 63 represented a probable adult of indeterminate sex aged over 15 years at the time of death. This burial was located at a bearing of S25°W at a distance of 22.85 m from Datum A. The burial was at a depth of 87 to 93 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position and orientation.

Burial 63 was in extremely fragmentary condition with only a portion of the right ilium, right arm, and left fibula present. The age of the individual was based on complete epiphyseal union and overall adult size of the elements presented. The sex of this individual was indeterminate. No pathologies or anomalies were noted. No nonmetric traits were observed. Postcranial measurements were taken for this burial.

Burial 64

Burial 64 represented an adult male aged over 30 years at the time of death. This burial was located at a bearing of S4°E at a distance of 17.5 m from Datum A. The burial was at a depth of 81 to 96 cm below Datum A in the Vaqueros paleosol. This individual was in a loose flex position on the right side, facing southeast. This primary inhumation was oriented 316° from magnetic north.

Burial 64 was in fair condition with most elements present. Rodent activity was evident in the chest area. The stature of this individual was estimated from a field measurement of the left femur to be 1603.16 cm The age of the individual was based on complete epiphyseal union, dental eruption, extreme dental wear and endocranial suture closure. The determination of sex was based on well-developed supraorbital tori, prominent external occipital protuberance, a large mastoid, thickened mandibular symphysis, the configuration of the sciatic notch, and overall robusticity of the skeleton. Pathologies included osteoarthritic changes in the lumbar region of the spine and femoral condyles. Nonmetric traits observed were a metopic suture remnant at glabellar region, bilaterally asymmetrical supraorbital foramina, absence of one zygomatic foramen, and a bilaterally pointed chin form. Cranial, dental , and postcranial measurements were taken for this burial.

Burial 65

Burial 65 represented an adult male aged between 26 and 40 years at the time of death. This burial was located at a bearing of S8°W at a distance of 18.5 m from Datum A. The burial was at a depth of 87-97 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing southeast. This primary inhumation was oriented 40° from magnetic north.

Burial 65 was in good condition with most elements except the hands and feet present. The age of the individual was based on complete epiphyseal union, dental eruption, heavy dental wear and endocranial suture closure. The determination of sex was based on prominent supraorbital tori, a pronounced external occipital protuberance, rugose gonial angle, and the robusticity of the overall skeleton. Pathologies included osteophytic lipping on articular surfaces of hand phalanges found in the cranial matrix, dental caries, resorption of alveolar bone, and periodontal disease. Nonmetric traits observed were a trace of metopic suture remnant at glabella, bilaterally symmetrical supraorbital foramina, double zygomatic foramina, bilaterally ridged occiput form, and a bilaterally pointed chin. Cranial, dental, and postcranial measurements were taken for this burial.

Two *Haliotis* composite ornaments (95-8-99 and 95-8-100) and 3 *Olivella* Spire-Lopped beads were recovered from the matrix of Burial 65. Both *Haliotis* ornaments were found in the vicinity of the right shoulder, almost under the chin of the individual. One rectangular *Haliotis* ornament had a Normal Sequin bead adhered to it with asphaltum. The other ornament had a *Olivella* Square Saddle bead similarly attached.

Burial 66

Burial 66 represented a juvenile of indeterminate sex aged between 4 and 6 years at the time of death. This burial was located at a bearing of S10°W at a distance of 22.4 m from Datum A. The burial was at a depth of 64 to 77 cm below Datum A in the Vaqueros paleosol. This individual was of indeterminate position and orientation. This was a primary inhumation

Burial 66 was in poorly preserved condition with most elements absent. The elements present were in very fragmentary condition. The age of the individual was based on incomplete epiphyseal union of the vertebrae, presence of deciduous teeth, eruption of permanent teeth, and dental wear. The determination of sex was not possible. The only pathology noted was foramen caecum hypoplasia displayed on the right mandibular first molar. Nonmetric traits observed were a fully fused (absent) metopic suture and a bilaterally pointed chin form. Dental and postcranial measurements were taken for this burial.

Burial 67

Burial 67 represented an adult male aged between 26 and 35 years at the time of death. This burial was located at a bearing of S9°E at a distance of 37.7 m from Datum A. The burial was at a depth of 77 to 85 cm below Datum A in the Vaqueros paleosol. This individual was in a semi-extended position on the back, facing west. This burial was associated with a humerus from an additional smaller individual. The interment of Burial 111 may have removed the distal portions of the legs of Burial 67. Burial 67 represented a primary inhumation oriented 194° from magnetic north.

Burial 67 was in fair condition with most elements present in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, dental wear and endocranial suture closure. The determination of sex was based on large mastoids, a prominent external occipital protuberance, and the robusticity of the overall skeleton. No pathologies or anomalies were noted. Nonmetric traits observed were a bilaterally ridged occiput form and a bilaterally pointed chin. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 68

Burial 68 represented an adult of indeterminate sex over the age of 18 at the time of death. This burial was located at a bearing of S65°E at a distance of 37.7 m from Datum M2. The burial was at a depth of 70 to 80 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position and orientation. This burial was a primary inhumation.

Burial 68 was represented by fragments of the hipbones, arms, and legs. The condition of these elements was fragmentary. The age of the individual was based on the size of the long bones and the thickness of

the cortex. The sex was indeterminate. Possible periostisis was noted on the proximal shaft of the left tibia. No nonmetric traits were observed. Postcranial measurements were taken for this burial.

Burial 69

Burial 69 represented an adult probable female aged between 39 and 44 years at the time of death. This burial was located at a bearing of S8°W at a distance of 5.3 m from Datum A. The burial was at a depth of 103 to 118 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing down. One tooth of another adult individual was associated with this burial. This primary inhumation was oriented 250° from magnetic north.

Burial 69 was in fair condition with most elements present in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, extreme dental wear, endocranial suture closure, and the pubic symphyseal face (Todd's phase VIII). The determination of sex was based on a small mastoid, non-prominent supraorbital tori, non-rugose gonial angle, and the configuration of the sciatic notch as noted in the field. Pathologies included dental hypoplasia and phalanges with osteophytic changes. Nonmetric traits observed were a metopic suture still persistent only at glabella, single supraorbital foramina, single zygomatic foramina, and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Five *Olivella* Spire-Lopped beads and 3 *Olivella* Saucer beads were recovered from the burial matrix, scattered around the cranium of Burial 69.

Burial 70

Burial 70 represented a probable adult of indeterminate sex over the age of 14 at the time of death. This burial was located at a bearing of S15°E at a distance of 8.5 m from Datum A. The burial was at a depth of 89 to 101 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side. This primary inhumation was accompanied by one other individual, Burial 70A.

Burial 70 was in poor condition with most elements present in very fragmented condition. No cranium or pelvic girdle was present. The determination of age was based on fused phalanges and a field note of fused epiphysis of all long bones. The sex of this individual was indeterminate. No pathologies or anomalies were noted. No nonmetric traits were observed. Postcranial measurements were taken for this burial.

Four bead fragments, 15 *Olivella* Spire-Lopped beads, and 3 *Olivella* Saucer beads were recovered from the matrix of Burial 70. Fourteen of the Spire-Lopped beads were located around the wrists and lower arms of the individual.

Burial 70A

Burial 70A represented an adolescent of indeterminate sex aged between 12 and 15 years at the time of death. This burial was located at a bearing of S15°E at a distance of 8.5 m from Datum A. The burial was at a depth of 89 to 101 cm below Datum A in the Vaqueros paleosol. This individual was commingled with Burial 70 and was only distinguishable by the age difference of the two skeletons. The remains were too fragmentary to determine position or orientation.

Burial 70A was in poor condition. Some teeth, two arm bones, and leg bones were present. The age of the individual was based on incomplete epiphyseal union, dental eruption, dental root development, and light dental wear. Sex was indeterminate due to the young age of the individual. Pathologies included slight pitting and grooving on the anterior teeth. Anomalous dental enamel extensions were noted on the buccal surfaces of the maxillary molars and on the buccal and lingual aspects of the mandibular molars. No nonmetric traits were observed. Dental and postcranial measurements were taken for this burial.

Burial 71

Burial 71 represented a possible female adolescent between the ages of 14 and 18 years at the time of death. This burial was located at a bearing of S5°E at a distance of 6.1 m from Datum A. The burial was at a depth of 93 to 109 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing southeast. This primary inhumation was oriented 220° from magnetic north.

Burial 71 was in poor condition with most elements present in fragmentary state. The age of the individual was based on recent epiphyseal union, dental eruption, and light to moderate dental wear. The determination of sex was based on the overall gracility of the skeleton. No pathologies or anomalies were noted. No nonmetric traits were observed. Dental cranial, and postcranial measurements were taken for this burial.

One *Olivella* Saucer bead was found in the matrix of Burial 71.

Burial 72

Burial 72 represented an adult probable female aged between 30 and 45 years at the time of death. This burial was located at a bearing of N65°W at a distance of 4.2 m from Datum A. The burial was at a depth of 103 to 115 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing east. This primary inhumation was oriented 200° from magnetic north.

Burial 72 was in poor condition with some long bones, partial cranium, and one hand present in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, dental wear and endocranial suture closure. The determination of sex was based on the gracility of the mastoid, supraorbital tori, and long bones. The only pathology noted was eburnation of a condyle of the left femur. Nonmetric traits observed were a slight remnant of the metopic suture present only at glabella, single supraorbital foramina, and single zygomatic foramina. Cranial, dental, and postcranial measurements were taken.

Burial 73

Burial 73 represented an adult of indeterminate sex aged over 30 years at the time of death. This burial was located at a bearing of S32°W at a distance of 6.4 m from Datum A. The burial was at a depth of 94 to 114 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing west. This primary inhumation was oriented 320° from magnetic north.

Burial 73 was in poor condition with most elements present in a very fragmentary form. The age of the individual was based on complete dental eruption, extreme dental wear, and endocranial suture closure. The sex of this individual was indeterminate. No pathologies or anomalies were noted. No nonmetric traits were observed. Postcranial measurements were taken for this burial.

One *Olivella* Spire-Lopped bead was recovered from the burial matrix.

A sample of wood charcoal collected from the burial matrix produced a radiocarbon date of 2380 +/- 80 B.P. (Beta-93712), or 2355 cal B.P.

Burial 74 — Designation not used.

Burial 75

Burial 75 represented an adult female aged between 23 and 33 years at the time of death. This burial was located at a bearing of S46°W at a distance of 7.9 m from Datum A. The burial was at a depth of 76 to 88 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing west. This primary inhumation was oriented 220° from magnetic north.

Burial 75 was in extremely poor condition with most elements present in fragmentary form. The age of the individual was based on complete epiphyseal union, dental eruption, moderate to heavy dental wear and endocranial suture closure. The determination of sex was based on the gracility of the mastoid, configuration of the gonial angle of the mandible, and the gracility of the overall skeleton. Pathologies included dental hypoplasia, hypercementosis of the tooth roots, resorption of the alveolar surface on the left mandible, and osteophytic lipping on cervical vertebrae. Nonmetric traits observed were double zygomatic foramina and an auditory exostosis. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 76

Burial 76 was an adult of indeterminate sex who was 26+ years of age at the time of death. This burial was located at a bearing of S12°E at a distance of 4.1 m from Datum A. The burial was situated 101 to 114 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 230° from magnetic north, with the head facing south.

All skeletal sections except the pelvic girdle were represented. The shoulder girdle and axial skeleton were represented by single fragments of an acromion process, a cervical vertebral body, and a lumbar vertebral lamina, with rib fragments. All other sections were incomplete, and very fragmented. Based on dental wear, and endocranial suture closure, the age of the individual was determined to be 28-29+ years. The sex of the individual could not be determined. Pathologies present included a cervical vertebra with increased porosity on the superior surface of the body. Dental pathologies included a large dental carie on the occlusal surface of the right maxillary M3, a small carie on the distal surface of the right maxillary M1 at the cervicoenamel junction, and two small caries on the occlusal surface of the right mandibular M3. Cementum was present at the superior portions of the left and right maxillary canines, indicating hypercementosis. Enamel hypoplasia was present in the form of irregular surface texture on the buccal sides of the left and right maxillary canine crowns at the cervicoenamel junction. Enamel extensions appear on all molars present except for the maxillary M1s, and the right mandibular M1. Various dental and postcranial measurements were recorded. The only nonmetric trait recordable was the bilateral point form of the mandible.

A total of 23 *Olivella* Saucer and 41 Spire-Lopped beads were found with Burial 76. The majority of the beads were located in the area of the pelvic girdle, while some were recovered from around the left wrist. A conical sandstone pestle (95-8-109) was positioned parallel to the body, located under the left humerus, in front of the face.

Burial 77

Burial 77 was an adult of indeterminate sex who was 20 to 26 years old at the time of death. This burial was located at a bearing of S44°E at a distance of 6.7 m from Datum A. The burial was situated 95 to 105 cm below Datum A, at the B horizon transition of the Vaqueros paleosol. This burial was a primary inhumation, interred in an indeterminate position. Orientation could not be determined.

Preservation of the remains was very poor, with only small portions of the cranium, a fragment of the humerus, and a portion of the right medial femur condyle identifiable in the laboratory. All other fragments are of indeterminate long bones, and portions of the pelvis as identified in the field. The age of the individual was determined based on endocranial suture closure. Due to poor preservation, the sex of the individual could not be determined. No pathologies were noted, no measurements nor nonmetric traits, were recordable.

Burial 78

Burial 78 was an adult of indeterminate sex who was 28-40 years of age at the time of death. This burial was located at a bearing of N30°E at a distance of 1.9 m from the Datum A. The burial was situated 103 to 119 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 240° from magnetic north, with the head facing south.

The remains were all poorly preserved and very fragmented. All skeletal sections except the shoulder girdle were identified in the laboratory. The shoulder girdle is represented by a number of indeterminate fragments that were identified in the field as a left scapula. Based on epiphyseal union, and dental wear, the age of the individual was determined to be 28-40 years. The sex of the individual could not be determined. No pathologies were noted. Dental measurements were recorded. Cranial measurements were limited to the zygomatic. Postcranial measurements were also recorded. Nonmetric traits recorded include the presence of zygomatic foramina. An extra right fibula midshaft shaft section was identified in the laboratory with Burial 78. This was not given a separate burial number.

A total of 73 *Macoma* Disk beads were found with Burial 78. The majority were concentrated in the area of the pelvic girdle, while others were scattered throughout the burial matrix.

Burial 79

Burial 79 was a juvenile of indeterminate sex who was 6-7 years of age at the time of death. This burial was located at a bearing of S11°W at a distance of 33.3 m from Datum M3. The burial was situated 95 to 108 cm below Datum A, in the Vaqueros paleosol. Burial 79 was represented by a cranium only.

The cranium was very fragmented, and incomplete. Based on dental eruption, and dental wear, the age of the individual was determined to be 6-7 years. Due to the young age, sex was indeterminate. The right maxillary M1 had foramen caecum hypoplasia appearing on the buccal surface between the protoconid and the hypoconid. The mandibular M1 had three roots, one mesial, one distal, and one lingual. Measurements were recorded for the mandible.

Burial 80

Burial 80 was an adult possible female who was 22 to 26 years of age at the time of death. This burial was located at a bearing of S14°W at a distance of 41.3 m from Datum M3. The burial was situated 77 to 86 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the left side, oriented 204° from magnetic north, with the head facing down.

All skeletal sections except the shoulder girdle, and the upper limbs were represented. All remains were very fragmented. Based on endocranial suture closure, the age of the individual was determined to be 22 to 26 years. Based on the gracility of the external occipital protuberance, and the configuration of the greater sciatic notch, the sex of the individual was determined to be possible female. No pathologies were noted. Postcranial measurements for the femora and tibiae were recorded, as were various nonmetric cranial traits.

Burial 81

Burial 81 was an adult possible male who was 20-25 years of age at the time of death. This burial was located at a bearing of S53°E at a distance of 5.1 m from Datum A. The burial was situated 105 to 118 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 247° from magnetic north.

All skeletal sections except the cranium, and shoulder girdle are represented. The remains were poorly preserved and fragmentary, with most elements identified in the field. Based on dental wear, the age of the individual was determined to be 20-25 years. Based on the robustness of the left humerus, the sex of the individual was determined to be a possible male. No pathologies were noted. Slight horizontal striations were present on the labial surface of the maxillary left I2. Dental measurements for all teeth were recorded, and postcranial measurements were recorded for the humeri, and left femur.

A cluster of 1 *Olivella* Saucer and 46 Spire-Lopped beads was identified in the area of the distal right humerus positioned in the thoracic region. Four bone "wands" (95-8-118) were found under the area of the chest.

Burial 82

Burial 82 was an adult probable male who was 26 to 35 years of age at the time of death. This burial was located at a bearing of S38°W at a distance of 3.1 m from Datum A. The burial was situated 96 to 118 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the left side, oriented 280° from magnetic north, with the head facing north and down.

All skeletal elements were represented by fragmentary remains. The age of the individual was determined based on dental wear and endocranial suture closure. Based on the overall robustness of the right mastoid, gonial angle and ascending ramus, plus the large cross section dimensions of the right fibula and hand phalanges, the sex of the individual was determined to be a probable male. Dental enamel hypoplasia was present in the form of slight pits on the labial surface of the left maxillary I2. A supernumerary tooth was present between the left maxillary I2 and canine. Enamel extensions are present on the right maxillary M2, and M3. Very faint horizontal striations were present on the crowns of all molars. Measurements for the right mastoid were taken, as were those for the teeth, and right fibula. Some nonmetric cranial traits were also recorded. Burial 82A was identified with Burial 82 in the laboratory.

A total of 5 *Olivella* Saucer beads, 74 *Olivella* Spire-lopped beads, and 4 *Olivella* Split beads, along with 1 *Macoma* disk bead, were recovered from the burial matrix. The beads were found in the cranial, left scapula, and lumbar areas.

Burial 82A

Burial 82A was an adolescent of indeterminate sex, who was 12 to 15 years of age at the time of death. Burial 82A was identified in the laboratory with Burial 82.

Burial 82A was represented by seven teeth., the age of the individual was determined based on dental eruption and development.. Due to the young age of the individual, and the lack of remains in general, the sex of the individual could not be determined. Foramen ceacum hypoplasia was present on the buccal sides of the left and right mandibular M2s. An area of light pitting appears on the mesial side of the labial surface of the left maxillary I2, indicating enamel hypoplasia. Dental measurements were recorded for all teeth present.

Burial 83

Burial 83 was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of S30°E at a distance of 1.3 m from Datum A. The burial was situated 108 to 119 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a loose flex position, on the left side, oriented 240° from magnetic north, the cranium was displaced.

The remains of this burial were very fragmented. All skeletal sections except the shoulder girdle, axial skeleton, and pelvic girdle were represented. Based on the epiphyseal union of the left femur, tibiae, and tarsals, the individual was determined to be an adult. The sex of the individual could not be determined. No pathologies were noted. A number of postcranial measurements were recorded.

A large concentration of 2,416 *Olivella* Saucer beads, 389 *Olivella* Spire-Lopped beads, and 4 *Olivella* bead fragments were recovered from the area around the pelvic girdle. The majority of Saucer beads were found with the ventral surface of one bead resting on the dorsal surface of the next, indicating that the beads were probably strung. Twelve *Haliotis* ornaments were also recovered (95-8-1947, -1948a, -1948b, -1948c, -1949, -1950a, -1950b, -1950c, -1950d, -1950e, -1950f, -1951). These ornaments were also located near the pelvic girdle, with some found stacked.

Burial 84

Burial 84 was an adult possible female who was 25 to 35 years of age at the time of death. This burial was located at a bearing of S35°E at a distance of 7.4 m from Datum A. The burial was situated 104 to 116 cm below Datum A, in the A/B horizon transition of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight dorsal flex position, oriented 180° from magnetic north, with the head facing east.

The burial was deteriorated and highly fragmented. All skeletal sections except the shoulder girdle, and vertebrae were represented. Based on epiphyseal union, and dental wear, the age of the individual was determined to be 25 to 35 years. Based on the overall gracility of the remains, and the non-acute bilateral point morphology of the mandible, the sex of the individual was determined to be female. A small pre-mortem hole was present on the right scaphoid at the palmar margin. A dental carie was present on the lingual side of the left mandibular M2 root just inferior to the cervicoenamel junction. The mandibular right P4 had pits in a linear formation on the labial surface. Enamel extensions were present on the buccal sides of a number of molars. Some dental and postcranial measurements were recorded. A few nonmetric traits including bilateral chin form were also recorded.

One *Olivella* Saucer and 7 Spire-Lopped beads were recovered from the burial matrix.

Burial 85

Burial 85 was an adult of indeterminate sex who was 25 to 30 years of age at the time of death. This burial was located at a bearing of S1°W at a distance of 6.0 m from Datum A. The burial was situated 96 to 117 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a loose flex position, on their dorsal surface, oriented 240° from magnetic north, with the head facing southwest.

Although all skeletal sections were represented, they were highly fragmented. The age of the individual was determined based on dental wear.. The sex of the individual could not be determined. No pathologies were noted, although dental anomalies were present. Enamel extensions were present on most molars, and one premolar. Single slight grooves were present around the necks, at the cervicoenamel junctions, of the left mandibular M3, and the maxillary M3's. Both dental and postcranial measurements were recorded.

A total of 21 *Olivella* Saucer beads were recovered from the cranial, and abdominal areas of Burial 85.

Burial 86

Burial 86 was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of S21°W at a distance of 45.2 m from Datum M3. The burial was situated 104 to 109 cm below Datum A, in the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the left side. The orientation was indeterminate.

The preservation of the remains was poor, with most skeletal portions were extremely fragmented. A left mandibular canine tooth root was the only cranial element present. The pelvic girdle, upper limbs, and lower limbs were represented by multiple fragments. Based on epiphyseal union of the radial head and the iliac crest, and on dental wear, the individual was determined to be an adult. The sex of the individual could not be determined. No pathologies were noted. Postcranial measurements for the radius, and fibula were recorded.

A sample of wood charcoal collected from the burial matrix was submitted for radiocarbon analysis, producing a date of 2670 +/- 90 B.P. (Beta-93713), or 2765 cal B.P.

Burial 87

Burial 87 was a juvenile of indeterminate sex who was 4 to 6 years of age at the time of death. This burial was located at a bearing of S9°E, at a distance of 4.0 m from Datum A. The burial was situated 100 to 110 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation of indeterminate position, and orientation.

The preservation of the remains was poor. All skeletal sections except the axial skeleton were represented. Based on unfused epiphyses, and the size of the long bones, the age of the individual was determined to be 4-6 years. Due to the young age of the individual and poor preservation of the remains, sex could not be determined. No pathologies were noted. Postcranial measurements were limited to those for the ulna, and radius.

A single *Haliotis* ornament (95-8-134) was recovered from the burial matrix of Burial 87.

Burial 88

Burial 88 was an infant of indeterminate sex who was 6 to 9 months of age at the time of death. This burial was located at a bearing of S35°E at a distance of 7.9 m from Datum A. The burial was situated 105 to 114 cm below Datum A, in the A/B horizon transition of the Vaqueros paleosol. This burial was a primary inhumation. Position and orientation of the burial were indeterminate.

Preservation of the remains was poor; all elements were very fragmentary. Portions of the cranium, shoulder girdle, and axial skeleton, were present. Based on the incomplete epiphyseal union, and dental eruption sequence, the age of the individual was determined to be 6 to 9 months. Due to the young age of the individual sex could not be determined. No pathologies were noted. Dental measurements were recorded.

A total of 43 *OlivellaI* Saucer beads and 49 *Olivella* Spire-Lopped beads were found with Burial 88. Five of the Spire-lopped beads were found at the posterior area of the cranium, 9 Spire-lopped beads were scattered throughout the burial matrix, and the rest of the beads were clustered just northeast of the cranium.

Burial 89

Burial 89 was and adult of indeterminate sex who was 25 to 35 years of age at the time of death. This burial was located at a bearing of S19°E at a distance of 7.3 m from Datum A. The burial was situated 89 to 101 cm below Datum A, in the A/B horizon transition of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 220° from magnetic north, with the head facing down.

The remains were poorly preserved and very fragmented. Portions of all skeletal sections except the shoulder girdle, pelvic girdle, and the inferior portions of the upper limbs were identifiable in the laboratory. Based on dental eruption and dental wear, the age of the individual was determined to be 25 to 30 years. The sex of the individual could not be determined. No formal pathologies were noted. Horizontal striations and surface pitting was present on the buccal surfaces of the right maxillary I2, and canine. The right maxillary P4 also had

a slight groove near the cervicoenamel junction that encircled the crown. Postcranial measurements recorded were limited to the left femur. Dental measurements were recorded.

Burial 90

Burial 90 was a young adult male who was 18 to 30 years of age at the time of death. This burial was located at a bearing of S65°E at a distance of 2.8 m from Datum A. The burial was situated 114 to 130 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight ventral flex position, oriented 45° from magnetic north, with the head facing east. Burial 90 was found commingled with Burial 90A, Burial 90B, Burial 101. Burial 90C was identified in the laboratory.

Although portions of all skeletal sections were represented, the remains were poorly preserved and very fragmented. Based on dental wear, the individual was determined to be a young adult. Based on cranial features such as robust mastoids, and a rugose gonial angle, the sex of the individual was determined to be male. Dental enamel hypoplasia was evident in the form of labial surface pitting of the maxillary right canine. Faint grooves at the cervicoenamel junction encircling the crowns of all premolars and molars were present. Cranial measurements for the mastoids, and mandible were recorded, as were dental measurements for all teeth. Various postcranial measurements for all long bones except the tibiae were also recorded.

A total of 4 *Olivella* Split beads, 19 *Olivella* Saucer beads, 177 Spire-Lopped beads, and 5 *Olivella* bead fragments were found with Burial 90. Most of the Spire-Lopped beads (160) were found near the pelvic girdle in a belt-like arrangement. The other beads were also found in the area of the pelvic girdle or scattered randomly throughout the burial matrix. Two *Haliotis* ornaments (95-8-140, -141) were also recovered from the vicinity of the pelvic girdle.

Burial 90A

Burial 90A was an adult possible female who was 18 to 23 years of age at the time of death. This burial was located at a bearing of S65°E at a distance of 2.8 m from Datum A. The burial was situated 124 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. The type of inhumation, and position was indeterminate. Burial 90A was found in the field commingled with Burial 90, Burial 90B, Burial 101, and Burial 90C.

The remains were poorly preserved, very fragmented, and limited to the cranium/mandible only. Based on the state of dental eruption, dental wear, and ectocranial suture closure, the age of the individual was determined to be 18 to 23 years. Based on the gracility of the external occipital protuberance, and the gracile dimensions of the right mastoid, the sex of the individual was determined to be possible female. A small abscess was present on the right mastoid. Enamel hypoplasia was evident on numerous teeth. Single slight grooves that encircled the crowns of the mandibular molars were also present. Anomalous enamel extensions were also present on the buccal sides of the maxillary left M2, and the mandibular right M2. Dental measurements were recorded for most teeth, cranial measurements were limited to the right mastoid. Some cranial nonmetric traits were recorded including chin form, and some facial foramina.

Burial 90B

Burial 90B was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of S65°E at a distance of 2.8 m from Datum A. The burial was situated 124 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. Type of inhumation, and both the position and orientation of interment were indeterminate.

Burial 90B was found in the field commingled with Burials 90, 90A, 90C, and 101. The remains were poorly preserved, very fragmented, and represented portions of the axial skeleton, and upper limbs only. Based on the fused epiphyses of the distal right humerus, the age of the individual was determined to be greater than 16 years. Due to the lack of remains, the sex of the individual could not be determined. No pathologies were noted. Various postcranial measurements were recorded for the right upper limbs only.

Burial 90C

Burial 90C was a juvenile/adolescent of indeterminate sex who was 8 to 16 years of age at the time of death. Burial 90C was identified in the laboratory. Burial 90C was commingled with Burials 90A, 90B, and 101. The remains were preserved in fair condition, although fragmented. Based on the unfused femoral head, the age of the individual was determined to be 8 to 16 years. Due to a lack of remains, and the young age of the individual, sex could not be determined. No pathologies were noted. Some postcranial measurements were recorded for the left humerus, and left patella.

Burial 91

Burial 91 was an adult probable female who was 28 to 35 years of age at the time of death. This burial was located at a bearing of S25°E at a distance of 2.9 m from Datum A. The burial was situated 105 to 116 cm below Datum A, within the Vaqueros paleosol. This burial was a primary inhumation, with the position of interment and orientation unknown.

Although all skeletal sections were represented, the remains were poorly preserved and very fragmented. Based on dental wear, and endocranial suture closure, the age of the individual was determined to be 28-35 years. Based on the gracile dimensions of the right mastoid, and the gracility of the mandible, the individual was determined to be a probable female. No pathologies were noted. An anomalous lateral facet was present on the anterior surface of the right patella. Measurements of the mastoids and mandible were recorded. Postcranial measurements were limited to portions of the humeri, and the right femur. Dental measurements were recorded for a few teeth.

Two *Olivella* Spire-Lopped beads were recovered from the burial matrix of Burial 91.

Burial 92

Burial 92 was an adolescent possible female who was 16 to 20 years of age at the time of death. This burial was located at a bearing of S24°E at a distance of 2.5 m from Datum A. The burial was situated 109 to 120 cm below Datum A, in the Vaqueros paleosol. This burial was a possible secondary inhumation, with position and orientation unknown.

Burial 92 was represented by a very deteriorated skull and miscellaneous rib fragments. Based on rib tubercle fusion, dental eruption, dental wear, and endocranial suture closure, the age of the individual was determined to be 16 to 20 years. Based on cranial gracility of the superciliary arches, and the non-prominent and non-rugose external occipital protuberance, the sex of the individual was determined to be female. No pathologies were noted, although faint buccal side transverse interruptions were present on a number of teeth. A single enamel extension was present on the buccal side of the left maxillary M3. Dental measurements, and some nonmetric cranial traits were recorded, including some facial foramina.

Burial 93

Burial 93 was an adult of indeterminate sex who was 20 to 25 years of age at the time of death. This burial was located at a bearing of S20°E at a distance of 2.1 m from Datum A. The burial was situated 115 to 128 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, with position and orientation unknown.

Burial 93 was represented by an extremely fragmented and incomplete cranium. Based on dental eruption, dental wear, and endocranial suture closure, the age of the individual was determined to be 20 to 25 years. Due to the poor preservation of the remains, the sex of the individual could not be determined. No pathologies were noted. Slight horizontal striations were present on the labial surface of the right maxillary I1. Enamel extensions are present on the buccal sides of all mandibular molars, and the left maxillary M2. Dental measurements were recorded. Burial 93 was in close proximity to Burials 82, 91, 92, and 120.

Burial 94

Burial 94 was an adult possible male who was more than 18 years of age at the time of death. This burial was located at a bearing of S84°E at a distance of 8.5 m from Datum A. The burial was situated 105 to 116 cm

below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight ventral flex position, oriented 320° from magnetic north, with the head facing down.

Although all skeletal sections were represented, the remains were poorly preserved and extremely fragmented. Based on dental wear and dental eruption, the individual was determined to be an adult. Based on robust superciliary arches, and a robust and rugose mandibular symphysis, the sex of the individual was determined to be possible male. No pathologies were noted. Cranial measurements recordable were limited to the left mastoid, and the mandibular symphysis. Postcranial measurements were recorded only for the right femoral midshaft. Some nonmetric cranial traits were recorded, including chin form and various facial foramina.

Burial 95

Burial 95 was an adult female who was 18 to 19 years of age at the time of death. This burial was located at a bearing of S55°E at a distance of 2.2 m from Datum A. The burial was situated 108 to 121 cm below the Datum A plane, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the left side, oriented 255° from magnetic north.

Although all skeletal sections except the shoulder girdle were represented, the remains were extremely fragmented. Based on epiphyseal union, the age of the individual was determined to be 18 to 19 years. Based on gracile mandibular dimensions, gracile postcranial dimensions, and a medio-laterally elongated iliopubic ramus, the sex of the individual was determined to be female. No pathologies were noted. Various postcranial measurements were recorded for the upper and lower limbs, and the left hipbone.

A total of 3 *Olivella* Spire-Lopped beads and 6 Saucer beads were found with Burial 95. Two of the Saucer beads were located near the pelvic girdle, with the other 7 beads were found individually in the burial matrix.

Burial 96

Burial 96 was an adult female who was 30 to 35 years of age at the time of death. This burial was located at a bearing of N84°E at a distance of 21.9 m from Datum A. The burial was situated 108 to 123 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a ventrally extended position, oriented 290° from magnetic north, with the head facing down.

All skeletal sections were represented; some were complete, others were fragmented. Based on dental wear, and endocranial suture closure, the age of the individual was determined to be 30 to 35 years. Based on the gracile form of the superciliary arches, vertical frontal squama, slight to moderate form of the external occipital protuberance of the cranium, and pronounced preauricular sulci, the sex of the individual was determined to be female. Dental enamel hypoplasia was evident by the presence of a labial surface groove, and slight surface pitting on the mandibular left canine. A number of both cranial and postcranial measurements were recorded. Cranial nonmetric traits, including chin form, occiput form, and facial foramina were recorded.

Burial 97

Burial 97 was an infant/juvenile of indeterminate sex who was 2 to 6 years of age at the time of death. This burial was located at a bearing of N88°E at a distance of 40.0 m from Datum M2. The burial was situated 105 to 117 cm below Datum A, in the B horizon of the Vaqueros paleosol. This burial was a primary inhumation. Position and orientation were indeterminate.

The remains were poorly preserved and extremely fragmented, with only portions of the cranium, shoulder girdle, axial skeleton, and humerus represented. Based on the unfused basilar area of the occipital, the unfused lateral portion of the basicranium, and unfused neural arches, the age of the individual was determined to be less than 6 years. Due to the young age of the individual, the sex of the individual could not be determined. No pathologies were noted. No measurements were recorded.

A total of 20 *Olivella* Saucer beads were found under the cranium of Burial 97. A single *Haliotis* shell fragment (95-8-2042), with ground edges, was found on top of the remains.

Burial 98

Burial 98 was an adult probable male who was 28 to 35 years of age at the time of death. This burial was located at a bearing of N88°E at a distance of 42.0 m from Datum M2. The burial was situated 96 to 104 cm below the Datum A plane, in the Vaqueros paleosol. This burial was a primary inhumation, interred in an indeterminate position, on the left side, oriented 236° from magnetic north, with the head facing north.

The preservation of the remains was poor, and extremely fragmentary. All skeletal sections were represented. The inferior lower limbs were completely absent. Based on dental wear, and endocranial suture closure, the age of the individual was determined to be 28 to35 years. Based on pronounced superciliary arches, a robust left mastoid, and an everted left gonial angle, the sex of the individual was determined to be probable male. A dental pathology was present in the form of a loss of the left mandibular M3 with subsequent bony resorption occurring. Enamel extensions occurred on both buccal and lingual sides of all molars except the right mandibular M2. Various cranial and postcranial measurements were recorded. A number of nonmetric cranial traits were recorded.

Burial 99

Burial 99 was an adult of indeterminate sex who was more than 18 years of age at the time of death. This burial was located at a bearing of S5°E at a distance 28.4 m from Datum M3. The burial was situated 103 to 118 cm below Datum A, in the A/B horizon transition of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 226° from magnetic north, with the head facing east.

The remains were poorly preserved and extremely fragmented, with all skeletal sections except the shoulder girdle and pelvic girdle represented. Based on epiphyseal union of the phalanges, and dental wear, the individual was determined to be an adult. Due to the extremely fragmented remains, the sex of the individual could not be determined. No pathologies were noted. Slight labial surface pitting was present on the maxillary left canine. Cranial measurements were limited to the mandibular thickness, with postcranial measurements limited to the midshaft sections of the right radius, femur, and the left tibia.

A single *Olivella* Spire-Lopped bead was recovered from the burial matrix.

Burial 100

Burial 100 was an adolescent/adult who was 15 to 26 years of age at the time of death. This burial was located at a bearing of N180°E at a distance of 36.9 m from Datum M3. The burial was situated 78 to 88 cm below the Datum A plane, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 208° from magnetic north, with the head facing east.

The remains were poorly preserved, and extremely fragmented. All skeletal sections except the shoulder girdle, axial skeleton, and pelvic girdle were represented. Based on epiphyseal union of the phalanges, and open endocranial sutures, the age of the individual was determined to be 15 to23 years. The sex of the individual could not be determined. No pathologies were noted. An anomalous facet was present on the superior lateral corner of the right patella. Postcranial measurements were limited to the midshafts of the right femur, humerus, and left tibia.

Burial 101

Burial 101 represented an infant aged between 2 and 3 years at the time of death. This burial was located at a bearing of S65°E at a distance of 2.65 m from Datum A. The burial was at a depth of 124 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position and orientation. Burial 101 was commingled with Burials 90, 90A, and 90B. This was a primary inhumation.

Burial 101 was in fragmentary condition with only the cranial vault, teeth, and humeri present. The age of the individual was based on dental eruption and development of the deciduous teeth. The sex of this infant was indeterminate. An anomalous extra cusp, Carabelli's cusp, was noted on the buccal-mesial corner of the left maxillary deciduous second molar. No nonmetric traits were observed. Dental and postcranial measurements were taken for this burial.

Burial 102

Burial 102 represented an adult possible male aged between 22 and 26 years at the time of death. This burial was located at a bearing of S42°E at a distance of 2.35 m from Datum A. The burial was at a depth of 107 to 120 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position and orientation. This was a primary inhumation.

Burial 102 was in poor condition with most elements present in fragmentary form. The age of the individual was based on complete epiphyseal union, dental eruption, and moderate dental wear. The determination of sex was based on the robusticity and size of the femur. No pathologies or anomalies were noted. No nonmetric traits were observed. Postcranial measurements were taken for this burial.

Burial 103

Burial 103 represented an adult probable male aged between 30 and 35 years at the time of death. This burial was located at a bearing of N96°E at a distance of 46.0 m from Datum M2. The burial was at a depth of 103 to 130 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing northeast. This primary inhumation was oriented 279° from magnetic north.

Burial 103 was in fair to poor condition with most elements present in fragmentary form. Some bone showed rodent gnawing. The age of the individual was based on complete epiphyseal union, dental eruption, moderate to extreme dental wear and endocranial suture closure. The determination of sex was based on a prominent supraorbital torus, rugose external occipital protuberance, large mastoids, and the robusticity of the overall skeleton. Pathologies included multiple examples of osteoarthritis. Nonmetric traits observed were double supraorbital foramina, multiple zygomatic foramina, an auditory exostosis and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 104

Burial 104 represented an adult probable female over the age of 35 years at the time of death. This burial was located at a bearing of N180°E at a distance of 34.0 m from Datum M3. The burial was at a depth of 103 to 118 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing south. This primary inhumation was oriented 249° from magnetic north.

Burial 104 was in fair to poor condition with most elements present in fragmentary form. The age of the individual was based on complete epiphyseal union and endocranial suture closure. The determination of sex was based on moderately developed mastoids, and the gracility of the overall skeleton. No pathologies or anomalies were noted. Nonmetric traits observed were wormian bones in the lambdoid suture. Cranial and postcranial measurements were taken for this burial.

Twenty-two Spire-Lopped *Olivella* beads were recovered from the matrix of Burial 104. The beads were found near the right lower arm.

Burial 105

Burial 105 represented a juvenile of indeterminate sex between 4 and 5 years at the time of death. This burial was located at a bearing of S89°E at a distance of 37.6 m from Datum M2. The burial was at a depth of 91 to 104 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position and orientation. Teeth from an individual of a different age were found with this burial. Burial 105 was a primary inhumation.

Burial 105 was in poor condition. The elements present were a parietal, teeth, ribs, a humerus and a femur in fragmentary condition. The age of the individual was based on an unfused phalanx and the pattern of dental eruption. Sex was indeterminate. Pathologies included a transverse groove on the deciduous mandibular canine indicating dental hypoplasia. The only nonmetric trait noted was a bilaterally pointed chin form. Dental measurements were taken for this burial.

Burial 106

Burial 106 represented an adult probable female aged between 24 and 30 years at the time of death. This burial was located at a bearing of S11°W at a distance of 33.3 m from Datum M3. The burial was at a depth of

95 to 106 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing down. This was a primary inhumation. Burials 79, 106, 132, 133, and 134 were commingled. Burial 106 was oriented 200° from magnetic north.

Burial 106 was in fair condition with most elements present in fragmentary form. The age of the individual was based on complete epiphyseal union, dental eruption, extreme dental wear and endocranial suture closure. The determination of sex was based on an unpronounced supraorbital torus, moderate mastoid, and the gracility of the overall skeleton. Pathologies included a dental carie, periodontal disease, a slight transverse groove on teeth, and reactive bone growth the right humerus. A patella with an anomalous osteophytic growth was noted as well as dental enamel extensions. Nonmetric traits observed were multiple supraorbital foramina, and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

One *Olivella* Spire-Lopped bead and 2 Saucer beads were recovered in the matrix of Burial 106.

Burial 107

Burial 107 represented an adolescent of indeterminate sex aged between 13 and 15 years at the time of death. This burial was located at a bearing of S74°E at a distance of 36.8 m from Datum M2. The burial was at a depth of 67 to 82 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position. Burial 107 was commingled with another individual, Burial 107A. This primary inhumation was oriented 200° from magnetic north.

Burial 107 was in poor condition with most elements present in fragmentary form. The age of the individual was based on incomplete dental eruption and dental wear. The sex of this individual was indeterminate. No pathologies were noted, but anomalous dental enamel extensions were noted on the buccal surfaces of the maxillary molars and an extra cusp was present on a right second molar. No nonmetric traits were observed. Dental measurements were taken for this burial.

Burial 107A

Burial 107A represented an adult male aged between 26 and 29 years at the time of death. This burial was located at a bearing of S74°E at a distance of 36.8 m from Datum M2. The burial was at a depth of 67 to 82 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing west. Burial 107A was commingled with Burial 107. This primary inhumation was oriented 200° from magnetic north.

Burial 107A was in poor condition with most elements present in fragmentary form. The age of the individual was based on complete epiphyseal union, dental eruption, heavy to extreme dental wear and endocranial suture closure. The determination of sex was based on a pronounced supraorbital torus, rounded orbital rim, a pronounced external occipital protuberance, a rugose temporal line, and the configuration of the sciatic notch. No pathologies were noted. Anomalous dental enamel extensions were noted on the buccal surfaces of the left maxillary molars. The stature was estimated to be 172.5 cm based on a field measurement of the left femur. Nonmetric traits observed were a metopic suture that persisted only at glabellar region, single supraorbital foramina, single zygomatic foramina, an asteronic bone, and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

One *Olivella* Spire-Lopped bead, a chert projectile point (95-8-144), and the right side of a Canid mandible (95-8-146) were recovered in the burial matrix of Burial 107A. The Spire-Lopped bead was found near the frontal area of the cranium. The projectile point and canid mandible were near the spinal column.

Burial 108

Burial 108 represented an adolescent of indeterminate sex aged between 13 and 16 years at the time of death. This burial was located at a bearing of N84°E at a distance of 34.0 m from Datum M2. The burial was at a depth of 94 to 105 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing southeast. Burial 108 was interred just above an infant cremation, Burial 115. This primary inhumation was oriented 230° from magnetic north.

Burial 108 was in very poor condition with most elements present in fragmentary condition. The age of the individual was based on the recent fusion of the distal phalanges of the hand. The sex of this individual was

indeterminate. No pathologies or anomalies were noted. No nonmetric traits were observed. Postcranial measurements were taken for this burial.

Burial 109

Burial 109 represented an adult probable female over the age of 42 years at the time of death. This burial was located at a bearing of S25°W at a distance of 60.65 m from Datum M3. The burial was at a depth of 48 to 66 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate postcranial position with the cranium on the right side, facing west. This was a primary inhumation.

Burial 109 was in poor condition with only the skull, arms, and one scapula present in fragmentary form. Evidence of rodent disturbance was noted by the excavators. The age of the individual was based on complete dental eruption, heavy to extreme dental wear and endocranial suture closure. The determination of sex was based on rounded orbital margins, moderately developed supraorbital ridges, and small mastoids. A lingual abscess at the right mandibular first molar was the only pathology noted. Anomalous enamel extensions were noted on the buccal aspect of the mandibular first molars and the maxillary third molar. The only nonmetric trait observed was a rounded chin form. No measurements were taken for this burial.

Burial 110

Burial 110 represented an adult female aged between 24 and 27 years at the time of death. This burial was located at a bearing of N146°E at a distance of 19.0 m from Datum M2. The burial was at a depth of 12 to 27 cm below Datum A in the Vaqueros paleosol. This individual was in a ventral, semi-extended position with the head on the right side facing north. This primary inhumation was oriented 305° from magnetic north.

Burial 110 was in poor condition with most elements present in fragmentary form. The age of the individual was based on complete epiphyseal union, dental eruption, extreme dental wear and endocranial suture closure. The determination of sex was based on unpronounced supraorbital tori, light temporal lines, a gracile external occipital protuberance, lack of rugosity of the gonial angle, a thin medio-laterally elongated iliopubic ramus, and the overall gracility of the skeleton. Pathologies included cribra orbitalia (porotic hyperstosis), noted on the inner surfaces of the eye sockets, mild dental hypoplasia on anterior teeth, peridontal disease, and reactive bone on the lunate surface of both acetabula. Nonmetric traits observed were multiple foramina and spurred notches on the supraorbital tori, metopic suture persistent only at glabella, double zygomatic foramina, wormian bones in both the sagittal and lambdoidal sutures, and an H-form pterion. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 111

Burial 111 represented an adult male over the age of 18 at the time of death. This burial was located at a bearing of N118°E at a distance of 42.0 m from Datum M2. The burial was at a depth of 87 to 97 cm below Datum A in the Vaqueros paleosol. This individual was in a dorsal, semi-extended position. This primary inhumation was oriented 324° from magnetic north.

Burial 111 was in fair condition with the skull missing. Most elements were present in fragmentary condition. The age of the individual was based on complete epiphyseal union. The determination of sex was based on the configuration of the sciatic notch, a nonelevated auricular facet, and a very large femoral head. Pathologies noted were cavitation (osteomyletis) on the distal posterior aspect of the right femur, osteophytic changes on the fifth lumbar vertebra, and cavitation of the dorsolateral aspect of the right ala of the sacrum. No nonmetric traits were observed. Postcranial measurements were taken for this burial.

Burial 112

Burial 112 represented a juvenile of indeterminate sex aged between 7 and 12 years at the time of death. This burial was located at a bearing of N89°E at a distance of 56.0 m from Datum M2. The burial was at a depth of 117 to 131 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position. This primary inhumation was oriented 290° from magnetic north.

Burial 112 was in fair to poor condition with most elements present in fragmentary condition. Rodent disturbance in the area of the burial was noted by the excavators. The age of the individual was based on

incomplete epiphyseal union and endocranial suture closure as well as the overall size of the elements. Even though the posterior chord of the sciatic notch was larger than the anterior chord, the sex was indeterminate due to the young age of the individual. No pathologies were noted. An anomalous deep vascular groove was noted bilaterally on the tibiae. No nonmetric traits were observed. Postcranial measurements were taken for this burial.

Burial 113

Burial 113 represented an adult possible female over the age of 26 years at the time of death. This burial was located at a bearing of N89°E at a distance of 48.5 m from Datum M2. The burial was at a depth of 98 to 118 cm below Datum A in the Vaqueros paleosol. This skeleton was positioned on its' back, facing up. This was a primary inhumation. Orientation and flexure could not be determined.

Burial 113 was in poor condition with most elements present in fragmentary condition. Rodent disturbance of this burial was noted by the excavators. The age of the individual was based on complete dental eruption, moderate to heavy dental wear and endocranial suture closure. The determination of sex was based on the lack of rugosity of the mastoids, lack of prominence of the supraorbital torus, and the gracility of the overall skeleton. No pathologies or anomalies were noted. Nonmetric traits observed were a single supraorbital foramina, a single postcondylar foramen, single hypoglossal canal, and a probable bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 114

Burial 114 represented an adolescent probable female aged between 16 and 18 years at the time of death. This burial was located at a bearing of N90°E at a distance of 48.4 m from Datum M2. The burial was at a depth of 85 to 107 cm below Datum A in the Vaqueros paleosol. This individual was in a dorsal, loose flex position with the head on the left side, facing north. This primary inhumation was oriented 220° from magnetic north.

Burial 114 was in poor condition with most elements present in fragmentary condition. This burial was heavily impacted by rodent damage. The age of the individual was based on incomplete epiphyseal union, dental eruption, very light dental wear and endocranial suture closure. The determination of sex as female was based on the equal size of the anterior and posterior sciatic chords. Large, but not long mastoids, blunt supraorbital tori, and well defined temporal lines added to the ambiguity, therefore the determination could only be assessed as probable female. Anomalous enamel extensions were noted on both the buccal and lingual aspects of the first and second molars. Nonmetric traits observed were single supraorbital notches, double zygomatic foramina, single postcondylar foramina, single parietal foramina, three wormian bones along the lambdoid suture, inion occiput form, and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 115

Burial 115 represented a juvenile of indeterminate sex age between 3 and 7 years at the time of cremation. This burial was located at a bearing of N84°E at a distance of 34.0 m from Datum M2. The burial was at a depth of 94 to 106 cm below Datum A in the Vaqueros paleosol. Burial 115 was cremated. The cremation was commingled with Burials 115A, a young adult female, and 115B, an uncremated infant. All three of the 115 burials were found at the feet of Burial 108.

Burial 115 was completely burned to the white chalky stage. Only portions of the cranium were identifiable as an infant/juvenile. The age of the individual was based on the size of the surviving elements. The sex of the individual was indeterminate. No pathologies or anomalies were noted. No nonmetric traits were observed. No measurements were possible.

One *Olivella* Spire-Lopped bead was recovered in the burial matrix of Burial 115.

Burial 115A

Burial 115A represented an adolescent/adult female over the age of 16 years at the time of cremation. This burial was located at a bearing of N84°E at a distance of 34.0 m from Datum M2. The burial was at a depth

of 94 to 106 cm below Datum A in the Vaqueros paleosol. The position and orientation were indeterminate. This cremation was commingled with Burials 115 and 115B. All of these burials were found at the feet of Burial 108.

Burial 115A was cremated to the chalky white stage. All bones are distorted and often eroded or burnt away. The age of the individual was based on complete epiphyseal union. The determination of sex was based on a slightly developed supraorbital region and the gracility of the overall skeleton. No pathologies or anomalies were noted. Nonmetric traits observed were a single supraorbital foramen and a single wormian bone on the lambdoid suture. No measurements were possible.

Burial 115B

Burial 115B represented an infant of indeterminate sex aged between 6 and 12 months at the time of death. This burial was located at a bearing of N84°E at a distance of 34.0 m from Datum M2. The burial was at a depth of 94 to 106 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position and orientation. This primary inhumation was commingled with Burials 115 and 115B.

Burial 115B was represented by portions of the cranial vault, and two deciduous tooth buds. The age of the individual was based on the deciduous tooth buds and the lack of development of the cranial vault. The sex of this infant was indeterminate. No pathologies or anomalies were noted. No nonmetric traits were noted. Dental measurements were taken for this burial.

Burial 116

Burial 116 represented an adult of indeterminate sex over the age of 18 at the time of death. This burial was located at a bearing of S16°W at a distance of 24.15 m from Datum M3. The burial was at a depth of 87 to 111 cm below Datum A in the Vaqueros paleosol. This individual was in a loose flex position on the left side, facing north. This primary inhumation was oriented 232° from magnetic north.

Burial 116 was in poor condition with most elements present in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, and moderate dental wear. The sex of this individual was indeterminate. A slight groove was noted on the distal aspect of mandibular premolars. The cranium was too fragmentary to observe nonmetric traits. Dental and postcranial measurements were taken for this burial.

Burial 117

Burial 117 represented an adult female aged between 28 and 34 years at the time of death. This burial was located at a bearing of S23°W at a distance of 24.8 m from Datum M3. The burial was at a depth of 106 to 120 cm below Datum A in the Vaqueros paleosol. This individual was in a loose flex position on the right side, facing east. This primary inhumation was oriented 208° from magnetic north.

Burial 117 was in poor condition with most elements present in fragmentary form. The age of the individual was based on complete epiphyseal union, dental eruption, heavy to extreme dental wear and endocranial suture closure. The determination of sex was based on unpronounced supraorbital tori, gracile mastoids, a small mandible, the configuration of the sciatic notch, and the overall gracility of the skeleton. Pathologies included osteophytic lipping on cervical vertebrae, osteophytic growth on a foot phalanx, periodontal disease, and hypercementosis of dental roots. Anomalous dental enamel extensions were noted on the buccal and lingual surfaces of molars. The left maxillary anterior premolar exhibited an unusual groove on the distal surface that may indicate a special use wear. Nonmetric traits observed were single medially spurred notches on the supraorbital tori, single and double zygomatic foramina, and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 118

Burial 118 represented an adult of indeterminate sex aged between 20 and 25 years at the time of death. This burial was located at a bearing of S13°W at a distance of 25.33 m from Datum M3. The burial was at a depth of 87 to 78 cm below Datum A in the Vaqueros paleosol. This individual was in an indeterminate position, facing down. This primary inhumation was oriented 195° from magnetic north.

Burial 118 was in extremely poor condition with most elements present in very fragmentary condition. The age of the individual was based on complete dental eruption and light to moderate dental wear. The sex of this individual was indeterminate. The only pathology noted was dental hypoplasia on the anterior teeth and premolars. No nonmetric traits were observed. Dental and postcranial measurements were taken.

Burial 119

Burial 119 represented an adult probable female aged between 26 and 35 years at the time of death. This burial was located at a bearing of S25°W at a distance of 24.7 m from Datum M3. The burial was at a depth of 124 to 132 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the right side, facing south. This primary inhumation was oriented 290° from magnetic north.

Burial 119 was in poor condition with most elements present in very fragmentary condition. Rodent disturbance was noted throughout this burial by the excavator. The age of the individual was based on complete epiphyseal union, dental eruption, extreme dental wear and endocranial suture closure. The determination of sex was based on the gracility of the overall skeleton. Pathologies included hypercementosis of dental roots, slight dental pitting, and osteophytic growth on a thoracic vertebra and the scapular glenoid fossa. Anomalous dental wear was noted that could possibly be attributed to a "special use" of the teeth. No nonmetric traits were observed. Dental and postcranial measurements were taken for this burial.

Burial 120

Burial 120 represented an adult male aged between 30 and 35 years at the time of death. This burial was located at a bearing of S10°W at a distance of 28.5 m from Datum M3. The burial was at a depth of 119 to 139 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing north. Burial 120 was commingled with elements from two other individuals inventoried in the lab as Burials 120A and 120C. This primary inhumation was oriented 250° from magnetic north.

Burial 120 was in poor condition with most elements present but fragmentary. The age of the individual was based on complete epiphyseal union, dental eruption, moderate to extreme dental wear and endocranial suture closure. The determination of sex was based on prominent superciliary arches, rugose gonial angles, and the robusticity of the overall skeleton. Pathologies included resorption of alveolar processes in the right mandible. Anomalous mesial wear found on the mandibular right third molar which could be special use wear. An anomalous dental enamel pearl was noted on the mesial surface of the right mandibular second molar. Nonmetric traits observed were a metopic suture open in the glabellar region and a bilaterally pointed chin with a median mound. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 120A

Burial 120A was an adult between the ages of 24 and 31 years based on the pattern of fourth sternal rib end ossification. This burial was commingled with Burial 120. The elements present were ribs, a scapula, a humerus, a vertebral body, and a fibula. Measurements were not possible.

One *Olivella* Spire-Loppedbead, 1 Split bead, and 6 Saucer beads were found in the matrix of Burial 120A.

Burial 12OB — Designation not used

Burial 120C

Burial 120C was an adult of indeterminate sex over the age of 18 at the time of death. This individual was commingled with Burial 120. A left humerus of adult size was the only element present. Measurements were not possible.

Burial 121

Burial 121 represented an adult of indeterminate sex aged between 22 and 26 years at the time of death. This burial was located at a bearing of S20°W at a distance of 19.4 m from Datum M3. The burial was at a depth

of 111 to 114 cm below Datum A in the Vaqueros paleosol. This individual was a primary inhumation in an indeterminate position and orientation.

Burial 121 was in very poor condition. The only elements present were parietal fragments, one premolar, a thoracic vertebra, and a metacarpal. All elements were in fragmentary condition. The age of the individual was based on heavy dental wear on the premolar and endocranial suture closure. The sex of this individual was indeterminate. No pathologies or anomalies were noted. No nonmetric traits were observed. No measurements were taken for this burial.

Burial 122

Burial 122 represented an adult probable male aged between 25 and 31 years at the time of death. This burial was located at a bearing of S29°W at a distance of 24.4 m from Datum M3. The burial was at a depth of 109 to 129 cm below Datum A in the Vaqueros paleosol. This individual was in a loose flex position on the left side, facing south. This primary inhumation was oriented 40° from magnetic north.

Burial 122 was in good condition with most elements present in fair condition. The age of the individual was based on complete epiphyseal union, heavy dental wear and endocranial suture closure. The determination of sex was based on slight prominence of the supraorbital tori, moderate mastoids, a robust deltoid tuberosity, and the robusticity of the overall skeleton. Pathologies included a dental abscess and foot phalanges fused with osteophytic growth. Faint horizontal grooves were observed on tooth crowns. Anomalous enamel extensions were noted on the lingual surface of the left mandibular first molar. An anomalous extra articular facet was noted on both tali between the anterior and posterior calcaneal articular surfaces. Nonmetric traits observed were a persistent metopic suture only at glabella, a supraorbital notch and foramen, single zygomatic foramen, and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

One *Macoma* Disk bead was recovered in the matrix of Burial 122.

Burial 123

Burial 123 represented an adult probable female aged between 19 and 24 years at the time of death. This burial was located at a bearing of S15°W at a distance of 18.5 m from Datum M3. The burial was at a depth of 108 to 122 below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing north. This primary inhumation was oriented 274° from magnetic north.

Burial 123 was in fair condition with most elements present in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, extreme dental wear and endocranial suture closure. The determination of sex was based on a light temporal line, the configuration of the sciatic notch, and the gracility of the overall skeleton. Dental hypoplasia on the enamel of the molars was the only pathology noted. Anomalous dental enamel extensions were noted on the buccal surfaces of molars. The only nonmetric trait observed was single zygomatic foramen. Dental and postcranial measurements were taken for this burial.

Burial 124

Burial 124 represented an adult of indeterminate sex over the age of 30 years at the time of death. This burial was located at a bearing of S2°E at a distance of 28.8 m from Datum M3. The burial was at a depth of 100 to 115 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing north. An extra individual, represented by anterior teeth, was commingled with Burial 124. This primary inhumation was oriented 248° from magnetic north.

Burial 124 was in poor condition with most elements present in fragmentary condition. The age of the individual was based on complete dental eruption and heavy to extreme dental wear. Sex was indeterminate. The only pathology noted was hypercementosis on dental roots. Slight grooves were noted on third molars. No nonmetric traits were observed. No measurements were taken for this burial.

A fossilized branch/root (95-8-163) was found along the back of the burial, extending from the distal right humerus to the proximal left femur.

Burial 125

Burial 125 represented an adult possible female over the age of 18 at the time of death. This burial was located at a bearing of S2°E at a distance of 28.1 m from Datum M3. The burial was at a depth of 96 to 109 cm below Datum A in the Vaqueros paleosol. This individual was in a tight ventral flex position, facing down. This primary inhumation was oriented 226° from magnetic north.

Burial 125 was in poorly preserved with most elements present in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, and light to moderate dental wear. The determination of sex as a possible female was based on a small mastoid, lack of prominence of the superciliary arches, lack of prominence of the external occipital protuberance, and the overall gracility of the skeleton. Pathologies included dental hypoplasia as well as caecum foramen hypoplasia. Anomalous enamel extensions on the buccal surface of a second molar. No nonmetric traits were observed. Cranial, dental, and postcranial measurements were taken for this burial.

One *Olivella* Spire-Lopped bead was recovered from the matrix of Burial 125.

Burial 126

Burial 126 was an adult of indeterminate sex who was 25 to 30 years of age at the time of death. This individual was at a bearing of S11°W at a distance of 26.4 m from Datum M3. The burial was situated 96 to 112 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 233° from magnetic north, with the head facing east. Burial 126 was commingled fashion Burial 131.

The preservation of the remains was poor and very fragmentary. All skeletal sections except the shoulder girdle were represented by incomplete fragments. Based on the epiphyseal union of the distal femora, dental wear, and endocranial suture closure, the age of the individual was determined to be 25 to 30 years. Due to the very fragmentary nature of the remains, the sex of the individual could not be determined. Osteophytic lipping was present on the femoral condyles. Enamel hypoplasia was present in the form of pitting on the labial surface of the maxillary left I2. Slight labial surface pits were present on the maxillary left canine. Enamel extension were present on a few maxillary and mandibular molars. Dental measurements and postcranial measurements for the upper and lower limbs were recorded.

Burial 127

Burial 127 was an adult of indeterminate sex who was 18 to 25 years old at the time of death. This burial was located at a bearing of N180°E at a distance of 29.4 m from Datum M3. The burial was situated 109 to 117 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, with position and orientation indeterminate.

The remains were poorly preserved, and extremely fragmented. Based on dental eruption and dental wear, the age of the individual was determined to be 18 to 25 years. Due to the poor preservation of the remains, the sex of the individual could not be determined. No pathologies were noted. Dental measurements were recorded for all teeth present, with postcranial measurements limited to the midshafts of the femora.

Burial 128

Burial 128 was and adult probable female who was 30+ years of age at the time of death. This burial was located at a bearing of S5°E at a distance of 28.5 m from Datum M3. The burial was situated 111 to 125 cm below Datum A, in the A/B horizon transition of the Vaqueros paleosol. Burial 128 was located under Burial 99. This burial was a primary inhumation, interred in a tight flex position, on the left side, oriented 80° from magnetic north, with the head facing south.

The preservation of the remains was poor, with all skeletal sections except the pelvic girdle represented. All sections were very fragmented with some elements identifiable only in the field. Based on dental wear, the age of the individual was determined to be 30 to 35 years. Based on the presence of gracile superciliary arches, and the gracile humeral head diameter, the sex of the individual was determined to be female. Pathologies were limited to an eburnation on a probable molar root. Dental measurements were limited to the mandibular M3's,

although multiple postcranial measurements were recorded. An extra right distal humerus shaft section was found with Burial 128, but not given a separate burial number.

A schist "pencil" (95- 8-168) was found placed inferior to the cranium, perpendicular to the cervical area of Burial 128.

Burial 129

Burial 129 was an adolescent/adult of indeterminate sex who was 15 to 23 years of age at the time of death. This burial was located at a bearing of S13°W at a distance of 27.4 m from Datum M3. The burial was situated 106 to 119 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 245° from magnetic north.

The remains were poorly preserved and very fragmented. All skeletal sections except the shoulder girdle and axial skeleton were represented. Based on epiphyseal union of the hand and foot phalanges, and the degree of endocranial suture closure, the age of the individual was determined to be 15 to 23 years. The sex of the individual was indeterminate. No pathologies were noted. No measurements were recorded.

Burial 130

Burial 130 was an adolescent/adult possible female who was 16 to 19 years of age at the time of death. This burial was located at a bearing of S14°W at a distance of 28.7 m from Datum M3. The burial was situated 93 to 112 cm below Datum A, in the A/B horizon transition of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the left side, oriented 260° from magnetic north, with the head facing north.

The remains were poorly preserved. Although all skeletal sections except the shoulder girdle were represented, they were very fragmented. Based on epiphyseal union of various epiphyses of the lower limbs, dental eruption, dental wear, and the state of endocranial suture closure, the age of the individual was determined to be 16 to 19 years. Based on the gracile dimensions of the right mastoid, and the small dimensions of the lower limbs, the sex of the individual was determined to be a possible female. Enamel hypoplasia was present as both transverse grooves, and buccal surface pitting on the mandibular canines, and various premolars. Foramen ceacum hypoplasia was evident on the buccal side of the mandibular right M2. Probable foramen ceacum hypoplasia was present on the distal side of the maxillary right M2. The mandibular M3s had single slight grooves encircling the crowns near the cervicoenamel junctions. Enamel extensions were present on the buccal surfaces of all molars except the mandibular left M3. Enamel extensions were also present on the lingual side of the maxillary right M1. Dental measurements were recorded for numerous teeth. An extra proximal radius metaphysis fragment was found in the laboratory with Burial 130, but was not given a separate burial number. This fragment is probably from a juvenile, based on its overall small dimensions.

Burial 131

Burial 131 was an adolescent/adult of indeterminate sex who was 16 to 19 years of age at the time of death. This burial was located at a bearing of S11°W at a distance of 26.4 m form Datum M3. The burial was situated 99 to 111 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight ventrally flexed position, oriented 227° from magnetic north, with the head facing northeast. Burial 131 was commingled with Burial 126.

The remains were poorly preserved and very fragmented. All skeletal sections were represented. Based on the state of epiphyseal union of the iliac crest, and phalanges, on dental eruption, and dental wear, the age of the individual was determined to be 15 to 19 years of age. Due to the poor preservation of the remains, sex could not be determined. No formal pathologies were noted. Slight grooves that encircled the crowns of a number of molars were present near their cervicoenamel junctions. Enamel hypoplasia was present in the form of grooves on the right and left mandibular premolars. Enamel extension were present on the buccal surfaces of all molars except the maxillary right M3. Dental measurements were recorded. Postcranial measurements were limited to various upper and lower limb midsections only. An additional maxillary left M3 (either near eruption or newly erupted) was found in the laboratory with Burial 131. This tooth was not given a separate burial number.

Burial 132

Burial 132 was an adult possible male who was 29 to 38 years old at the time of death. This burial was located at a bearing of S11°W at a distance of 33.3 m from Datum M3. The burial was situated 85 to 97cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight ventrally flexed position, oriented 224° from magnetic north, with the head facing down. Burial 132 was exhumed at the top of a cluster of burials that included Burial 79, Burial 106, Burial 133, and Burial 134.

The preservation of the remains was very poor. All elements were fragmentary and incomplete. All skeletal sections except the pelvic girdle were represented. Based on dental wear and endocranial suture closure, the age of the individual was determined to be 29 to 38 years. Based on the robust development of the superciliary arches, and the external occipital protuberance, the sex of the individual was determined to be possible male. No pathologies were noted. Anomalous enamel extensions were present on the buccal sides of the maxillary and mandibular right M2s. A number of dental and postcranial measurements were recorded.

Burial 133

Burial 133 was an adolescent of indeterminate sex who was 15 to 17 years of age at the time of death. This burial was located at a bearing of S11°W at a distance of 33.3 m from Datum M3. The burial was situated 94 to 107 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a loose flex position, on the right side, oriented 180° from magnetic north, with the head facing east. Burial 133 was within a cluster of burials that included Burial 79, Burial 106, Burial 132, and Burial 134. Burial 133 was interred with Burial 134 in a commingled fashion with their arms intertwined.

The preservation of the remains was very poor. Although all skeletal sections except the shoulder girdle were represented, the remains were very fragmented and incomplete. Based on the state of epiphyseal union, dental eruption, dental wear, endocranial suture closure, the stage of pubic symphysis modification, and the stage of sternal rib end ossification, the age of the individual was determined to be 15 to 17 years. Due to the poor preservation of the remains, the sex of the individual could not be determined. No pathologies were noted. An anomalous enamel extension was present on the buccal surface of the maxillary left M2. Dental measurements were recorded for all teeth present. Postcranial measurements were taken for both the upper and lower limbs. Three additional adult carpals were found with Burial 133, which do not belong to Burial 134, or Burial 132. It could not be determined if the carpals belonged to Burial 106. These elements were not given a separate burial number.

Burial 134

Burial 134 was an adult probable female who was 30+ years of age at the time of death. This burial was located at a bearing of S11°W at a distance of 33.3 m from Datum M3. The burial was situated 95 to 108 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a loose flex position, on the left side, oriented 200° from magnetic north, with the head facing west. Burial 134 was within a cluster of burials that included Burials 79, 106, 132, and 133. Burial 134 was interred with Burial 133, with their arms intertwined.

The preservation of the remains was very poor. Although all skeletal sections except the shoulder girdle were represented, the remains were very fragmented. Based on dental wear and the state of endocranial suture closure, the age of the individual was determined to be 30 to 45+ years. Based on cranial gracility, and the overall moderate to gracile morphology of the remains, the sex of the individual was determined to be a probable female. Stature was estimated to be 161.8 cm +/- 3.8 cm. From an infield measurement of the left femur. The only pathology noted was the presence of hypercementosis on the roots of the maxillary right M1. Postcranial measurements were limited to the upper and lower limbs. A few nonmetric cranial traits were recorded.

Burial 135

Burial 135 was an adult probable male who was 26 to 28 years of age at the time of death. This burial was located at a bearing of S31°W at a distance of 29.1 m from Datum M3. The burial was situated 91 to 109 cm below Datum A in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 224° from magnetic north.

The remains were very fragmented and incomplete. Although all skeletal sections were represented, the pelvic girdle was only identifiable in the field. Based on dental wear and endocranial suture closure, the age of the individual was determined to be 26 to 28 years of age. Based on the robustness of the supraorbital torus, the pronounced right temporal line, the thick frontal squama, the robust dimensions of the hand phalanges, and the robust dimensions of the lower limbs, the sex of the individual was determined to be probable male. An area of trauma and reactive bone growth was present on the left femur shaft near the distal end just superior to the popliteal surface. Also, the left femur had a pronounced gluteal tuberosity relative to the general dimension of the femur shaft. The tuberosity occurred from the proximal end to midshaft. Due to the incomplete nature of the preserved portion of the left femur, it was indeterminate whether the reactive bone growth was evidence for a fracture type trauma, or if such is indicative of myositis ossification. Two dental caries were present on the occlusal surface of the mandibular left M3. Enamel hypoplasia was present as faint laterally oriented linear occurrences on the sides of all mandibular molars except the mandibular left M1. Slight grooves were present on the distal surfaces at the cervicoenamel junctions of the mandibular P4s, and on both the maxillary right M3, and mandibular left M3. An anomalous enamel extension was present on the buccal side of the maxillary M2. Cranial measurements were limited to the right mastoid breadth. Dental measurements for most teeth were recorded. A few postcranial measurements were recorded. Nonmetric cranial traits including chin form and various facial foramina were also recorded.

Burial 136

Burial 136 was an adult probable male who was 26 to 30 years of age at the time of death. This burial was located at a bearing of S3°E at a distance of 27.9 m from Datum M3. The burial was situated 115 to 133 cm below Datum A, in the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, interred in a loose flex position, on the right side, oriented 194° from magnetic north, with the head facing south.

The preservation of the remains was poor. Although all skeletal sections were represented, they were very fragmentary and incomplete. Based on dental wear and endocranial suture closure, the age of the individual was determined to be 26 to 30 years. Based on the robustness of the temporal line, the robustness of the right mastoid, and the slightly everted gonial angles, the sex of the individual was determined to be male. Hypercementosis was present on the roots of all teeth except the mandibular right I1, left I2, and left canine. The mandibular right canine had slight buccal surface pitting. An enamel extension was present on the buccal side of the mandibular right M2. Cranial measurements were limited to the right mastoid. Dental measurements for most teeth were recorded. Postcranial measurements were recorded for most elements. A few nonmetric traits were recorded including some facial foramina.

Burial 137

Burial 137 was an adolescent of indeterminate sex who was 14 to 17 years of age at the time of death. This burial was located at a bearing of S24°W at a distance of 49.0 m from Datum M3. The burial was situated 60 to 66 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a semi-extended position, on the right side, oriented 212° from magnetic north, with the head facing southwest.

The preservation of the remains was poor. Although all skeletal sections were represented, the remains were very fragmented. Based on the state of epiphyseal union for the upper and lower limb elements and on both dental eruption and dental wear, the age of the individual was determined to be 14 to 17 years. The sex of the individual was indeterminate. Based on infield length measurements of the left radius and femur, the stature of this individual was estimated to be 159.88-169.32cm +/- 4.2 cm. Enamel hypoplasia in the form of slight transverse lines, and buccal surface pitting was evident on most anterior teeth. Enamel extensions were present on the buccal sides of all molars. Dental measurements were recorded for all teeth. Numerous postcranial measurements were recorded. Cranial measurements were limited to the mandibular symphysis height. Nonmetric cranial traits recordable were limited to the chin form.

A total of 167 *Olivella* Spire-Lopped beads were found associated with Burial 137. A concentration of 116 beads was found in the lumbar/pelvic girdle area, with the others found near the back, left arm, left lower leg, and between the femora.

Burial 138

Burial 138 was an adult probable female who was 42 to 47 years of age at the time of death. This burial was located at a bearing of S21°W at a distance of 59 m from Datum M3. The burial was situated 10 to 22 cm below Datum A, within the Brentwood soil at the rock transition. This burial was a primary inhumation, interred in a ventrally extended position, oriented 20° from magnetic north, with the head facing down.

The remains were poorly preserved. Although all skeletal sections except the shoulder girdle, and pelvic girdle were represented, all items were very fragmentary. Based on dental wear and endocranial suture closure, the age of the individual was determined to be 42 to 47 years. Although the frontal and temporal areas were well developed, based on the gracility of the external occipital protuberance and the gracility of the mandibular corpus and gonial angle, the sex of the individual was determined to be probable female. Osteophytic lipping was present on all left tarsals and the 1st metatarsal at the distal end. The right ulna exhibited a pit supero-posterior to the radial notch, possibly evidence of degeneration. Both radii had small anomalous holes in the center of their tuberosities. Dental pathologies included the evulsion of the mandibular right P4 ante-mortem, with subsequent alveolar resorption. The mandible exhibited periodontal disease, with the recession of the alveolus exposing the roots of the right M1. Postcranial measurements were recorded for a number of elements. Cranial measurements were limited to the left mastoid and the mandibular symphysis, while nonmetric cranial traits recorded included chin form, occiput form, and various frontal attributes.

Burial 139

Burial 139 was an adult possible male who was 25 to 35 years of age at the time of death. This burial was located at a bearing of S1°W at a distance of 36.0 m from Datum M3. The burial was situated 90 to 114 cm below Datum A, in the Vaqueros paleosol. The individual had been placed in a loose flex position on the right side, oriented 180° from magnetic north, with the head facing east.

The remains were poorly preserved and very fragmented. Although all skeletal sections were represented, most were single fragments. Based on dental wear, the age of the individual was determined to be 25 to 35 years. The sex of the individual was determined to be possible male, based on a moderately sized external occipital protuberance; a square, rugose, possibly everted left gonial angle; and the large dimensions of the humeri and femora.. Periodontal disease was present at the maxillary right P4/M1 position, with both teeth being extremely worn with partial resorption of the alveolus around the P4. There was a congenital absence of the mandibular right M3. An enamel extension was present on the buccal side of the mandibular M2, and a transverse groove was present encircling the crown near the cervicoenamel junction of the mandibular left M3. Cranial measurements were limited to the mandibular symphysis thickness, while dental measurements were taken for most teeth. Limited cranial nonmetric traits were recorded. Two extra left humerus shaft fragments were found in the laboratory with Burial 139 but were not given a separate burial number.

Although the skeleton was not burned, concentrations of wood charcoal were identified throughout the burial matrix. A sample of charcoal submitted for radiocarbon analysis, produced a date of 1900 +/- 90 B.P. (Beta-90633), or 1840 cal B.P.

Burial 140

Burial 140 was a adult possible female who was 30+ years of age at the time of death. This burial was located at a bearing of S1°W at a distance of 36 m from Datum M3. The burial was situated 89 to 104 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a flexed position, on the left side, oriented 166° from magnetic north, with the head facing west.

The preservation was very poor, and fragmentary. All skeletal sections except the axial skeleton were represented. Based on dental wear, the age of the individual was determined to be 30 to 35+ years. Based on the gracile size of the left mastoid, the sex of the individual was determined to be possible female. No pathologies were noted. Postcranial measurements were limited to the right radius and ulna.

Burial 141

Burial 141 was an adult female who was 19 to 20 years of age at the time of death. This burial was located at a bearing of S35°W at a distance of 42 m from Datum M3. The burial was situated 66 to 85 cm below

Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a ventral semi-extended position, oriented 322° from magnetic north, with the head facing down.

The remains were in fair condition, although fragmented. All skeletal sections were represented. Based on the degree of union of various epiphyses, on dental eruption, dental wear, endocranial suture closure, and the developmental condition of the pubic symphyseal faces, the age of the individual was determined to be 19 to 20 years. The sex of the individual was determined to be female, based on the overall gracility of the cranium, including the mandible; the gracile dimensions of the upper and lower limb elements; and the greater breadth of the posterior chords relative to the anterior chords of the left and right greater sciatic notches. Enamel hypoplasia was present in the form of slight buccal surface pitting and/or transverse grooves on all canines, maxillary I1s, and the mandibular left M3. Foramen caecum hypoplasia was present on the buccal side of the mandibular left M3. Individual dental caries were present on the protocone of the occlusal surface of the maxillary left M2, and in the central occlusal area of the maxillary left M3. Enamel extensions were present on all molars except the maxillary left M1. An enamel pearl was present on the maxillary right M2. Various cranial, dental, and postcranial measurements were recorded, as were numerous cranial nonmetric traits including chin form, metopic remnant, and various facial foramina.

Burial 142

Burial 142 was an adult male who was 20 to 24 years of age at the time of death. This burial was located at a bearing of S33°W at a distance of 38.7 m from Datum M3. The burial was situated 57 to 85 cm below Datum A, partially inset into the B horizon of the Vaqueros paleosol. This burial was a primary inhumation, interred in a ventrally extended position, oriented 328° from magnetic north, with the head facing east.

The remains were in fair condition, although fragmented. All skeletal sections were represented with some elements being nearly complete. Based on the degree of epiphyseal union, dental eruption, dental wear, and endocranial suture closure, the age of the individual was determined to be 20 to 24 years. Based on cranial robustness including rugose lingual surfaces of the gonial angles, the robust dimensions of the upper and lower limbs, and the chord proportions of the left greater sciatic notch, the sex of the individual was determined to be male. The stature of the individual was estimated to be 174 cm +/- 4.6 cm based on the length of the left radius. On the right mandible, anterior to the inferior most point of the mylohyoid sulcus there was an abscess approximately 3 mm in diameter. This small abscess is in a crater form with a projecting lip and defined internal concavity. Anterior to this is a similar, smaller hole of similar structure, approximately 0.75 mm in diameter. Both of these were surrounded by numerous smaller hole like intrusions of the bone surface, which appeared only in this area. The tooth roots for most of the anterior maxillary teeth were emerging through the anterior surface of the alveolar process. An enamel pearl was present on the distal side of the maxillary left M2. This individual had a congenital absence of the mandibular M3s. Numerous cranial, dental, and postcranial measurements were recorded, as were cranial nonmetric traits including chin form, and facial foramina.

Burial 143

Burial 143 was an adult possible male who was 30+ years of age at the time of death. This burial was located at a bearing of S27°W at a distance of 48.5 m from Datum M3. The burial was situated 68 to 72 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 206° from magnetic north, with the head facing down.

The remains were poorly preserved and fragmented. Based on dental wear, endocranial suture closure, and sternal end ossification of the rib, the age of the individual was determined to be 30 to 35+ years. Based on the overall robustness of the cranium and mandible in the areas of the superciliary arches, the temporal lines, the external occipital protuberance, and the gonial angles, the sex of the individual was determined to be possible male. Osteophytic lipping was present on the femoral condyles. Enamel hypoplasia was present in the form of shallow pits and/or transverse grooves on the labial surfaces of the maxillary right I2, and canines. Dental caries were present on the mandibular left P4 and M3. The mandibular right M3 was congenitally absent, and an enamel extension was present on the buccal side of the maxillary left M2. Both patellae had areas of anomalous muscle attachment on the superior lateral corners. A cranial anomaly was present in the form of the postica portion of the sagittal suture, and the media areas of the lambdoidal suture constituting a multitude of wormian

bones, so that each finger of the sutures was itself a separate wormian bone. A number of dental and postcranial measurements were recorded. An extra mandibular incisor was found in the laboratory with Burial 143, but was not given a separate burial number.

Burial 144

Burial 144 was an adult probable female who was 30+ years of age at the time of death. This burial was located at a bearing of S32°W at a distance of 37.3 m from Datum M3. The burial was situated 50 to 60cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in an extended position, on their ventral surface, oriented 127° from magnetic north, with the head facing down.

The remains were poorly preserved and very fragmented. All skeletal sections except the pelvic girdle, and lower limbs were present in fragmentary condition. Based on dental wear, and endocranial suture closure, the age of the individual was determined to be 30 to 35+ years. Based on moderately developed supraorbital torus, a moderately formed external occipital protuberance, small mastoids, and gracile lingual gonial angle surfaces, the individual was determined to be a probable female. Osteoarthritis was present on the margins of the cervical vertebral bodies. Hypercementosis was present on the root of the maxillary left P4. All teeth were extremely worn. Dental measurements recordable were limited to the maxillary M3s. Various cranial and post-cranial measurements were recorded. Cranial nonmetric traits including chin form, occiput form, and some facial foramina were also recorded.

Burial 145

Burial 145 was an adult male who was 40 to 45 years of age at the time of death. This burial was located at a bearing of S24°W at a distance of 61.1 m from Datum M3. The burial was situated 34 to 49 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the left side, oriented 294° from magnetic north, with the head facing northeast.

Although all skeletal sections were represented, preservation of the remains was poor. Based on dental wear, endocranial suture closure, and sternal rib end ossification, the age of the individual was determined to be 40 to 45 years. Based on cranial robustness including rugose lingual surfaces of the gonial angles, large metacarpals, and the robust dimensions of the humeri, the sex of the individual was determined to be male. Probable osteophytic lipping was present on the inferior posterior margin of the sternal end of the right clavicle. Periodontal disease and the loss of teeth followed with resorption of the alveolar process was evident throughout much of the mouth. Dental anomalies included a torus and bump formed on the mandibular right corpus, and possible use wear present on the mandibular molars. A supernumerary tooth occurred between the maxillary left I2, and canine. A possible left radius section with an exaggerated radial tuberosity was present. The cranium had a sagittal suture that when viewed from lambda, was offset to the right side. Various cranial, dental, and postcranial measurements were recorded. Nonmetric cranial traits recorded included chin form, occiput form, and some facial attributes.

Thirteen *Olivella* Spire-Lopped beads were collected from Burial 145. Eight of the beads were found in the chest area, while the remainder were found individually in the burial matrix.

Burial 146

Burial 146 was an adult of indeterminate sex who was 30+ years of age at the time of death. This burial was located at a bearing of S24°W at a distance of 52.7 m from Datum M3. The burial was situated 84 to 93 cm below Datum A, in the Vaqueros paleosol. The burial was a primary inhumation, interred in a flexed position, on the left side.

The remains were poorly preserved, very fragmented, and incomplete. All skeletal sections were represented. Based on dental wear, the age of the individual was determined to be 30+ years. Due to the fragmented and incomplete remains, sex could not be determined. Hypercementosis was present on the roots of the maxillary teeth. The roots of the mandibular right M3 were curled, and had evidence of hypercementosis on them. Cranial measurements were limited to the mandibular symphysis. Dental measurements could only be taken on the M3. Postcranial measurements could be recorded for the left humerus and radius only.

Burial 147

Burial 147 was an infant of indeterminate sex who was 1.5 to 2.5 years of age at the time of death. This burial was located at a bearing of S12°W at a distance of 60cm at 180° from the cranium of Burial 148. The burial was situated 107 to 119 cm below Datum A, in the A/B horizon transition of the Vaqueros paleosol. This burial was a primary inhumation, interred in a loose, dorsally flexed position, oriented 207° from magnetic north, with the head facing east.

The remains were in fair condition, although very fragmented and incomplete. All skeletal sections except the shoulder girdle were represented. The lumbar neural arches and the ilia were nearly complete. Based on the degree of epiphyseal union, on dental eruption, dental wear, and in-field measurements of one femur, the age of the individual was determined to be 1.5 to 2.5 years. Due to the young age of the individual, sex could not be determined. No pathologies were noted. Dental measurements were recorded for all teeth present. Postcranial measurements were limited to the femur. An adult maxillary I1 was found in the laboratory with Burial 147. This item was not given a separate burial number.

Sixty-one *Olivella* Spire-Lopped beads were found with Burial 147. Three of the beads were located with the cranium; the rest were found in a concentration to the right of the pelvic girdle.

Burial 148

Burial 148 was and adult male who was 19 to 24 years of age at the time of death. This burial was located at a bearing of S12°W at a distance of 28.6 m from Datum M3. The burial was situated 109 to 125 cm below Datum A, in the A/B horizon transition of the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the left side, oriented 230° from magnetic north, with the head facing northwest.

Although all skeletal sections were represented to varying degrees, the preservation of the remains was poor. All elements were fragmentary and incomplete. Based on the epiphyseal union of the left ischium, dental eruption, dental wear, and degree of endocranial suture closure, the age of the individual was determined to be 19 to 24 years. Based on the robustness of the mandible, the robust dimensions of the femora, left acetabulum, and right fibula, the sex of the individual was determined to be male. Stature was estimated from the length of the right fibula to be 167.4 cm +/- 3.2 cm No pathologies were noted. Dental anomalies included slight labial surface pitting occurring near the cervicoenamel junctions of the mandibular canines, and an enamel extension on the buccal side of the maxillary left M1. Various dental and postcranial measurements were recorded. Cranial nonmetric traits included the bilateral point chin form.

Eight *Olivella* Spire-Lopped beads and 211 *Olivella* Saucer beads were found with Burial 148. The Spire-Lopped beads were recovered individually from the burial matrix, and the Saucer beads were located near the lumbar and upper pelvic girdle. Some of the Saucers were found with the ventral surface of one bead resting on the dorsal surface of the next, indicating that the beads were probably strung.

Burial 149

Burial 149 was an adult female who was 25 to 29 years of age at the time of death. This burial was located at a bearing of S24°W at a distance of 55.8 m from Datum M3. The burial was situated 72 to 94 cm below Datum A, in the Vaqueros paleosol. This burial was a primary inhumation, interred in a tight flex position, on the right side, oriented 250° from magnetic north, with the head facing south.

The preservation of the remains was fair. All skeletal sections were represented to varying degrees. Based on dental wear, and endocranial suture closure, the age of the individual was determined to be 25 to 29 years. Based on overall cranial/mandibular gracility, the presence of a preauricular sulcus, and gracile femoral head diameters, the sex of the individual was determined to be female. A carious lesion was present on the occlusal surface of the left M3. The presence of hypercementosis was evident on the roots of the maxillary central incisors. Faint horizontal striations were present on the mandibular canines and premolars. Numerous dental, cranial, and postcranial measurements were recorded. Cranial nonmetrics included chin form, and various facial foramina.

Burial 150

Burial 150 was a adolescent/adult of indeterminate sex who was 15+ years of age at the time of death. This burial was located at a bearing of S32°W at a distance of 26.9 m from Datum M3. The burial was situated 98 to 102 cm below Datum A, in the Vaqueros paleosol. This burial was a secondary inhumation, with original position and orientation indeterminate.

The remains were poorly preserved and highly fragmented. Skeletal sections represented included a few teeth, the upper limbs, and lower limbs. Based on dental eruption and dental wear, the age of the individual was determined to be 15 to 16+. Due to the poorly preserved fragmentary remains, and the young age of the individual, sex could not be determined. No pathologies were noted. Anomalies included a slight groove at the cervicoenamel junction that encircled the crown of the mandibular left P4, and an enamel extension on the buccal side of the mandibular right M2. Dental measurements were recorded. Postcranial measurements were limited to the midshaft dimensions of the right radius.

Burial 151

Burial 151 represented an adult female aged between 22 and 26 years at the time of death. This burial was located at a bearing of S2°W at a distance of 35.0 m from Datum M3. The burial was at a depth of 111 to 131 cm below Datum A in the Vaqueros paleosol. This individual was in a tight, dorsal flex position, facing west. This primary inhumation was oriented 88° from magnetic north.

Burial 151 was in poor condition with most elements present in fragmentary form. The age of the individual was based on complete epiphyseal union, dental eruption, extreme dental wear and endocranial suture closure. The determination of sex was based on a gracile supraorbital torus, vertical forehead, moderate mastoid, moderately developed nuchal torus, square pubic body, and the configuration of the sciatic notch. Pathologies included a sacrum with cavitation of the left ala and dental hypercementosis. Anomalous double sustentacular facet on the right calcaneus were noted. The only nonmetric trait observed was double zygomatic foramina. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 152

Burial 152 represented an adult probable male aged between 25 and 35 years at the time of death. This burial was located at a bearing of S1°W at a distance of 33.4 m from Datum M3. The burial was at a depth of 113 to 126 cm below Datum A in the Vaqueros paleosol. This individual was in a dorsal, semi-extended position, facing north. Elements of an additional individual (Burial 152A) were found commingled with Burial 152. Burial 152 was a primary inhumation oriented 273° from magnetic north.

Burial 152 was in good condition with most elements present in fragmentary condition. Rodent damage was reported by the excavators. The age of the individual was based on complete epiphyseal union, dental eruption, moderate dental wear and endocranial suture closure. The determination of sex was based on prominent supraorbital tori, rugose temporal line, rugose gonial angle of the mandible, a large femur head, and a sciatic notch that was ambiguous with regard to sex. Pathologies included a carious lesion, periodontal disease, hypercementosis, and osteophytic lipping on cervical and thoracic vertebral bodies. Anomalous dental enamel pearl was noted on the left mandibular third molar. The stature of this individual was 163.064.66 cm based on the length of the femur, fibula and ulna. Nonmetric traits observed were a metopic suture persistent only at glabella, supraorbital foramen and notch, a distal mylohyoid bridge, and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

One Golden Eagle (*Aquila chrysaetos*) carpometacarpus (95-8-1996) was found in the mouth of Burial 152.

Burial 152A

Elements of an extra individual were found in the Burial 152 matrix. This burial was represented by a right radius and hand phalanges. Burial 152A had fused phalanges indicating an age above 15 years at the time of death. The radius was robust indicating a possible male. Measurements were taken.

Burial 153

Burial 153 represented an adult probable female aged between 20 and 26 years at the time of death. This burial was located at a bearing of S26°W at a distance of 35.8 m from Datum M3. The burial was at a depth of 94 to 109 cm below Datum A in the Vaqueros paleosol. This individual was disarticulated and commingled with Burial 153A.

Burial 153 was represented by the cranium, mandible, clavicle, hipbones, humerus, femora, and tibiae in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, heavy dental wear with light wear on the third molars, and endocranial suture closure. The determination of sex was based on the slight to moderate mastoid size, a non-everted gonial angle, moderately rugose chin, raised auricular facet, and the overall gracility of the skeleton. No pathologies were noted. Anomalous dental enamel extensions, and mastoid form were noted. Nonmetric traits observed were an exsutural mastoid foramen on the parietal, mastoid fistula, a single wormian bone on the lambdoid suture, and a rounded chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 153A

Burial 153A represented an adult probable male over the age of 30 years at the time of death. This burial was located at a bearing of S26°W at a distance of 35.8 m from Datum M3. The burial was at a depth of 94 to 109 cm below Datum A in the Vaqueros paleosol. This individual was disarticulated and commingled with Burial 153.

Burial 153A was in poor condition with most elements present in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, moderate to heavy dental wear and endocranial suture closure. The determination of sex was based on a moderately developed supraorbital torus, a moderately sized mastoid, a deep and thick mandibular symphysis, large acetabulum, and the robusticity of the overall skeleton. Pathologies included resorption of the alveolus, hypercementosis of dental roots, and osteophytic lipping on lumbar vertebrae. No nonmetric traits were observed. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 154

Burial 154 represented an adult probable male over the age of 30 years at the time of death. This burial was located at a bearing of S24°W at a distance of 37 m from Datum M3. The burial was at a depth of 117 to 137 cm below Datum A in the Vaqueros paleosol. This individual was in a ventrally extended position, facing down. This primary inhumation was oriented 318° from magnetic north.

Burial 154 was in fair condition with most elements present in nearly complete form. The age of the individual was based on complete epiphyseal union, dental eruption, and heavy dental wear relative to lighter wear on the third molars. The determination of sex was based on a moderately pronounced supraorbital torus, moderate mastoids, very robust chin, and the robusticity of the overall skeleton. Pathologies included periodontal disease, hypercementosis of the dental roots, and possible osteoporosis of the cervical vertebrae. Nonmetric traits observed were a single supraorbital notch, double infraorbital foramina, a single zygomatic foramen, and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 155

Burial 155 represented an adult probable female over the age of 18 at the time of death. This burial was located at a bearing of S20°W at a distance of 32.8 m from Datum M3. The burial was at a depth of 172 to 182 cm below Datum A in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing south. This primary inhumation was oriented 127° from magnetic north.

Burial 155 was in fair condition, but was lacking most of the upper body. Most elements present were in fragmentary condition. The age of the individual was based on complete epiphyseal union, dental eruption, and moderate to heavy dental wear. The determination of sex was based on a nonprominent supraorbital torus and the gracility of the overall skeleton. No pathologies were noted. An anomalous extra articular surface (possible squatting facet) was noted on the inferior surface of the right talus. No nonmetric traits were observed. Postcranial measurements were taken for this burial.

Twenty-two double-perforated, rectangular *Haliotis* ornaments (95-8-180 through -198, 95-8-2055, and 95-8-3051) were found in the burial matrix. Several of the ornaments were aligned in a row across the chest, indicating that they may have been strung or sewn to a garment.

CA-CCO-696 — NORTH LOCUS

A total of five burials were identified in the North Locus of CCO-696 during monitored construction grading. Three burials were recovered from the A horizon of the Vaqueros paleosol, one from the B horizon of the Vaqueros paleosol, and one from the A horizon of the Kellogg paleosol. Two adult males, one adult female, one adult, possible female, and one adult of indeterminate sex were represented. Two of the burials were associated with artifacts.

Burial 156

Burial 156 represented an adult male aged between 22 and 26 years at the time of death. This burial was located at a bearing of N88°E at a distance of 82 m from Datum M4. The burial was at a depth of 107 cm below Datum M5 in the Vaqueros paleosol. This individual was in a loose dorsal flex position, facing southwest. This primary inhumation was oriented 108° from magnetic north.

Burial 156 was in fair condition with most elements present in fragmentary form. The age of the individual was based on complete epiphyseal union, dental eruption, light dental wear, endocranial suture closure, and pubic symphyseal face. The determination of sex was based on rugose temporal lines, moderate to large mastoids, moderately developed external occipital protuberance, a rugose gonial angle, and sciatic notches with anterior chords larger than the posterior chords. Pathologies included porotic hyperstosis on the supraorbital tori, dental caries, suprasternal ossicles on the right superior aspect of the manubrium, and dental hypoplasia on canine teeth. Anomalous enamel extensions were noted on the buccal aspects molars. The stature of this individual was 156 to 161 cm estimated from the length of the humerus, radius, and ulna. Nonmetric traits observed were metopic suture persistent only at glabella, multiple notches and foramina on the supraorbital torus, multiple zygomatic foramina, at least one wormian bone on the lambdoid suture, a bilateral ridge occiput from, multiple mandibular foramina, and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Burial 157

Burial 157 represented the cremation of an adult of indeterminate sex, aged between 23 and 26 years at the time of death. This burial was located at a bearing of S85°E at a distance of 88 m from Datum M4. The burial was at a depth of 133 cm below Datum M5 in the Vaqueros paleosol. The orientation and position of the cremation were indeterminate.

Due to the cremation of the burial, only burnt portions of the cranium, one vertebra, acetabulum, humerus, and carpal were present. The age of the individual was based on complete epiphyseal union, dental eruption, and endocranial suture closure. The sex of this individual was indeterminate. No pathologies or anomalies were noted. No nonmetric traits were observed. No measurements were taken for this burial.

Forty-seven *Olivella* End-Ground beads, fragments of a sandstone pestle (95-8-2099), and two fragments of a serrated, Napa Valley obsidian projectile point (95-8-3003A,B) were recovered from the matrix of Burial 157. The projectile point was submitted for hydration analysis, producing a mean rim value of 2.1 microns.

A charcoal sample, collected from a dense concentration of wood charcoal in the cremation, was submitted for radiocarbon dating. The sample produced a date of 790 +/- 40 B.P. (Beta-93714), or 690 cal B.P.

Burial 158

Burial 158 represented an adult female over the age of 38 years at the time of death. This burial was located at a bearing of N70° E at a distance of 74 m from Datum M4. The burial was at a depth of 256 to 269 cm below Datum M5 in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing southwest. This primary inhumation was oriented 110° from magnetic north.

Burial 158 was in good condition with most elements present in fair to fragmentary form. The age of the individual was based on complete dental eruption, extreme dental wear and endocranial suture closure. The determination of sex was based on moderate sized mastoids, a vertical forehead, a moderately developed external occipital protuberance, moderate to well developed supraorbital tori, a non-everted gonial angle, and the overall gracility of the skeleton. Pathologies included tooth loss, very light wear on the maxillary third molars indicating no opposing surface, and probably congenitally absent mandibular third molars. Nonmetric traits observed were a single supraorbital foramina, absent zygomatic foramina, an auditory exostosis on the right, and a bilaterally pointed chin form. Cranial, dental, and postcranial measurements were taken for this burial.

Several large (5 to 20-cm-long), sandstone cobbles were positioned over the skeleton, possibly representing a cairn.

Burial 159

Burial 159 represented an adult male aged between 22 and 26 years at the time of death. This burial was located at a bearing of N4°E at a distance of 20 m from Datum M5. The burial was at a depth of 147 cm below Datum M5 in the Vaqueros paleosol. This individual was in a tight flex position on the left side, facing east. The hands of this individual were on the head. This primary inhumation was oriented 306° from magnetic north.

Burial 159 was in good condition with most elements present in fragmentary form. The age of the individual was based on complete epiphyseal union, dental eruption, heavy dental wear, endocranial suture closure, pubic symphyseal face analysis, and fourth rib sternal-end ossification. The determination of sex was based on small mastoids, a rugose and moderately developed external occipital protuberance, a rugose gonial angle, the configuration of the sciatic notch, numerous pelvic girdle sexual markers, and the overall robusticity of the skeleton. Pathologies included a dental carious lesion. In addition, an unidentified piece of bone was associated with this burial. It was an extraordinary sheet of bony material, labeled "sternum" in the field and considered unidentifable in the laboratory. A photograph of this pathology/anomaly is available. The only nonmetric trait observed was a bilaterally mounded occiput form. Cranial and postcranial measurements were taken for this burial.

One complete, Napa Valley obsidian. Stockton series projectile point (95-8-2017) was found between the pelvis and heels of this tightly flexed individual. The point produced a mean hydration value of 2.1 microns.

Burial 160

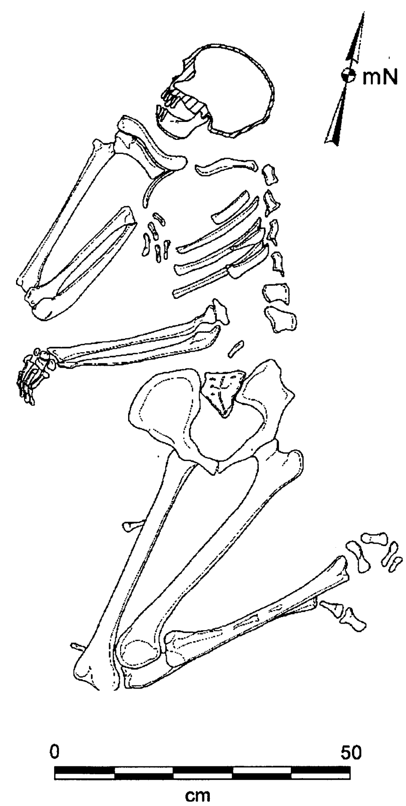
Burial 160 represented an adult possible female aged between 17 and 31 years at the time of death. This burial was located at a bearing of N13°E at a distance of 64 m from Datum M6. The burial was at a depth of 358 cm below Datum M6 in the Kellogg paleosol. The position of the burial was indeterminate. This was a primary inhumation. The orientation of the individual could not be determined.

Burial 160 was in poor condition with most elements present in fragmentary form. The age of the individual was determined based on recently fused epiphyseal union and endocranial suture closure. Sex was determined to be possible female based solely on the gracility of the skeleton. No pathologies or anomalies were noted. The only nonmetric trait observed was a single supraorbital foramen. Cranial and postcranial measurements were taken for this burial.

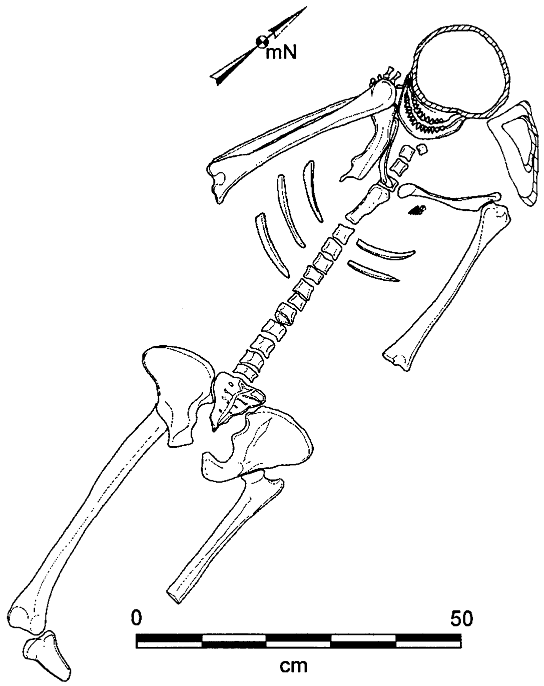
A cairn of 30+ sandstone cobbles was positioned over the skeleton. The cobbles, ranging in length from between 10 and 25 cm, formed a tight cluster measuring approximately 80 cm in diameter.

Several large pieces of charcoal were collected from beneath the sandstone cobbles, adjacent to the skeleton. A radiocarbon date of 6550 +/-80 B.P. (Beta-85993) was obtained from the sample.

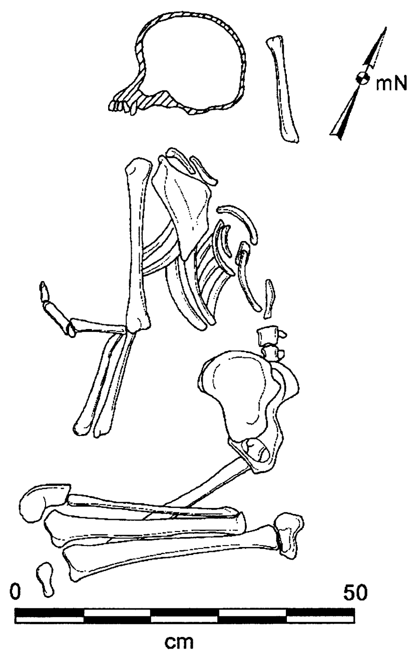
CA-CCO-637
Burial 1



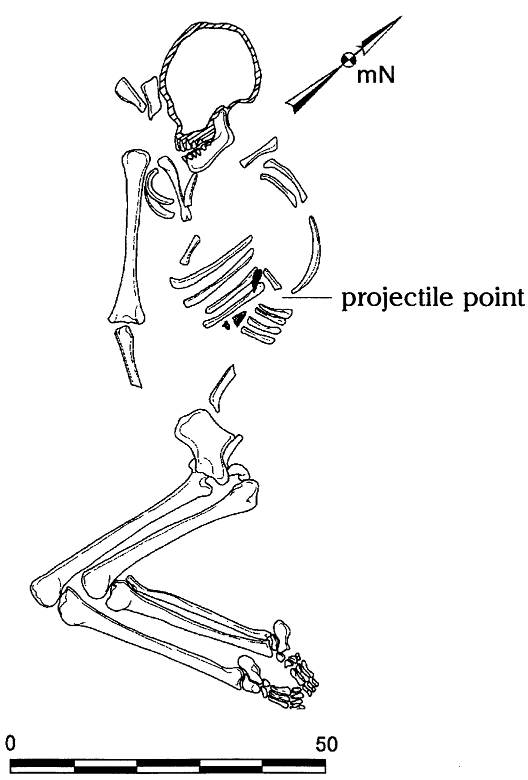
CA-CCO-637
Burial 4



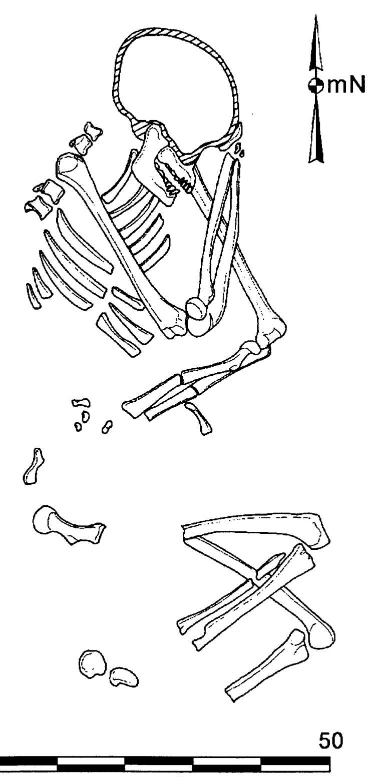
CA-CCO-637
Burial 5



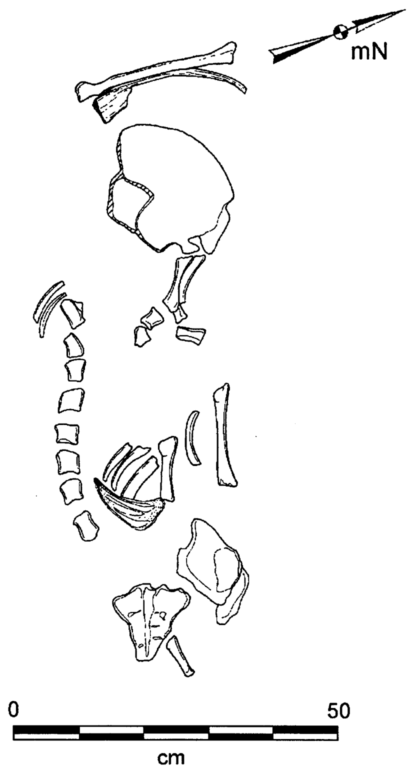
CA-CCO-637
Burial 6



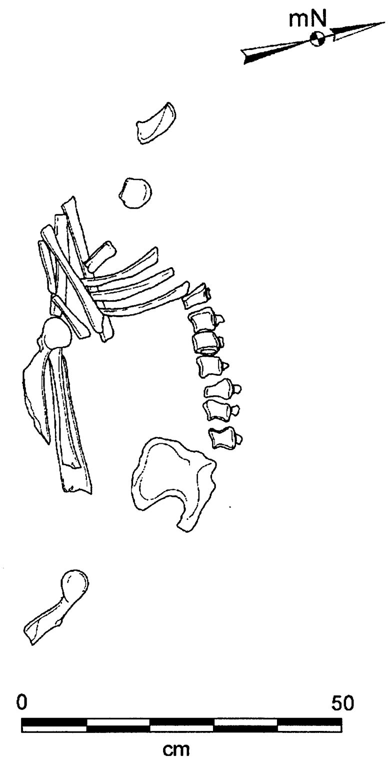
CA-CCO-637
Burial 7



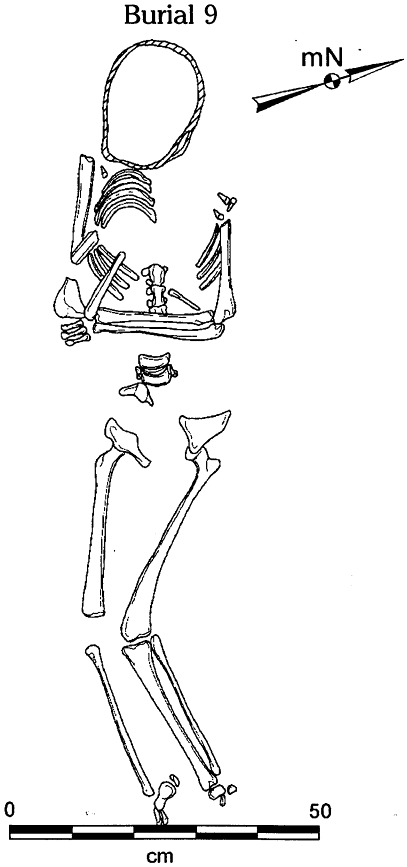
CA-CCO-637
Burial 8



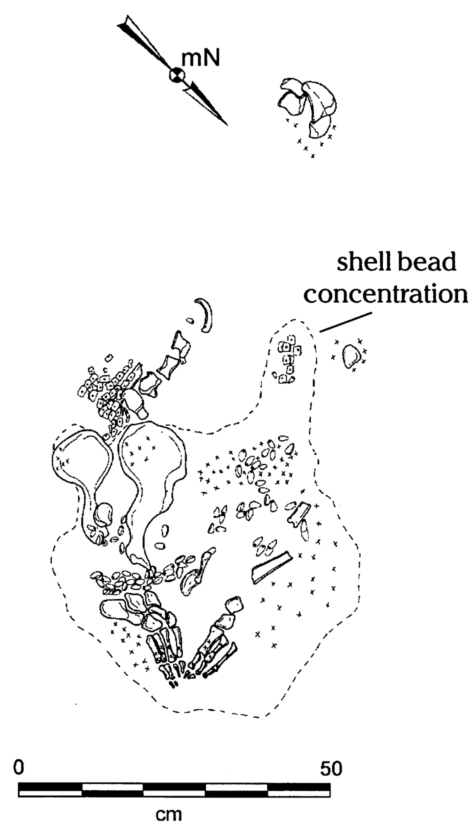
CA-CCO-637
Burial 9



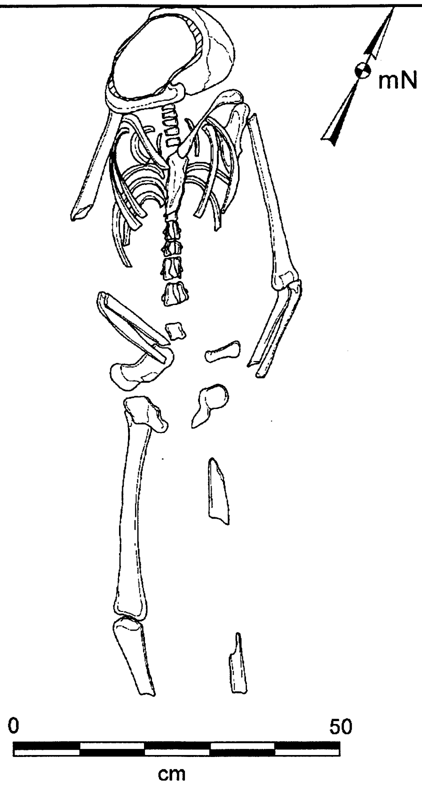
CA-CCO-637
Burial 10



CA-CCO-637
Burial 12



CA-CCO-637
Burial 14



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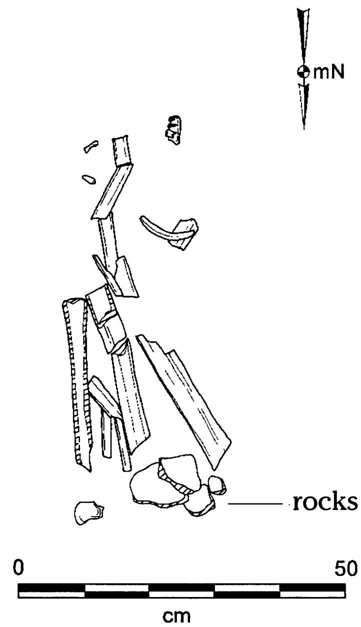
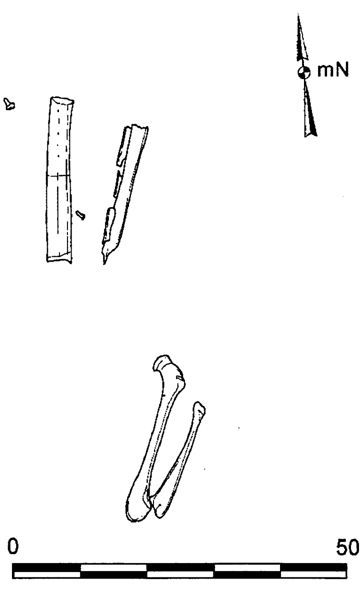
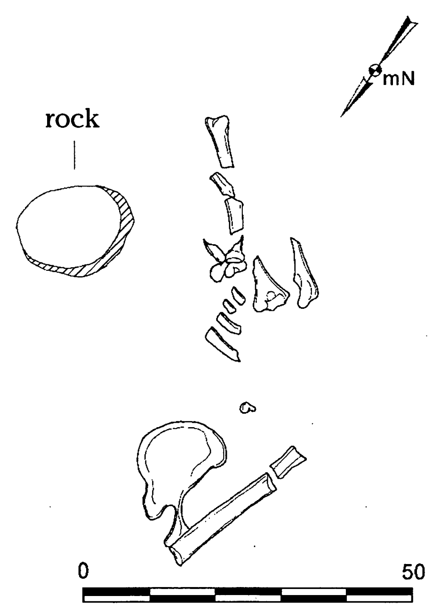
Burial 15



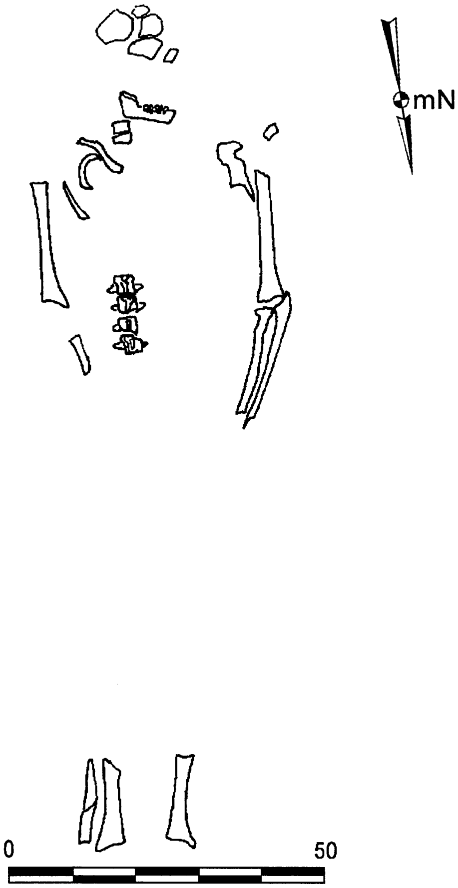
CA-CCO-637
Burial 16



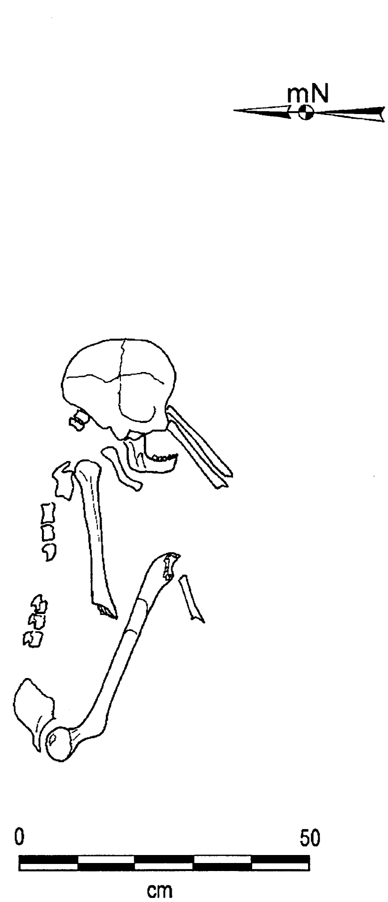
CA-CCO-637
Burial 17



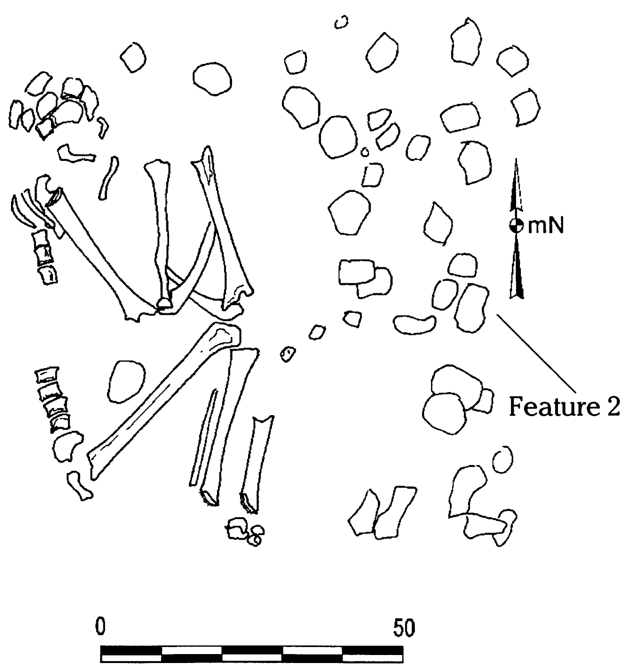
CA-CCO-637
Burial 18



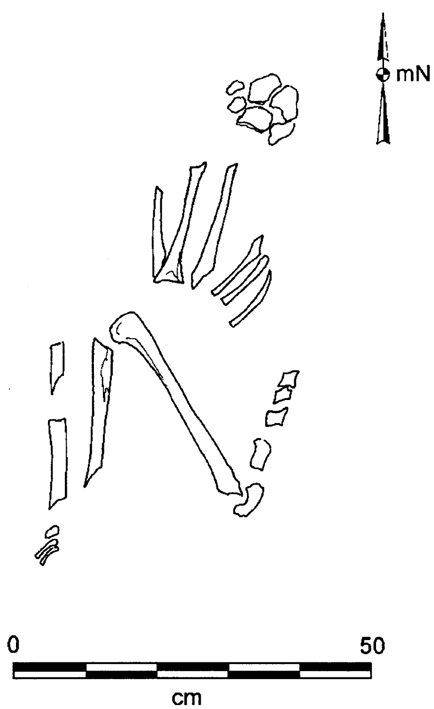
CA-CCO-696
Burial 1



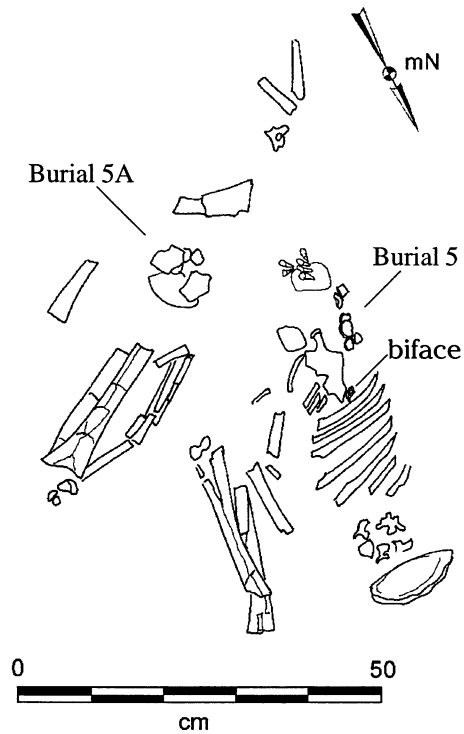
CA-CCO-696
Burial 2



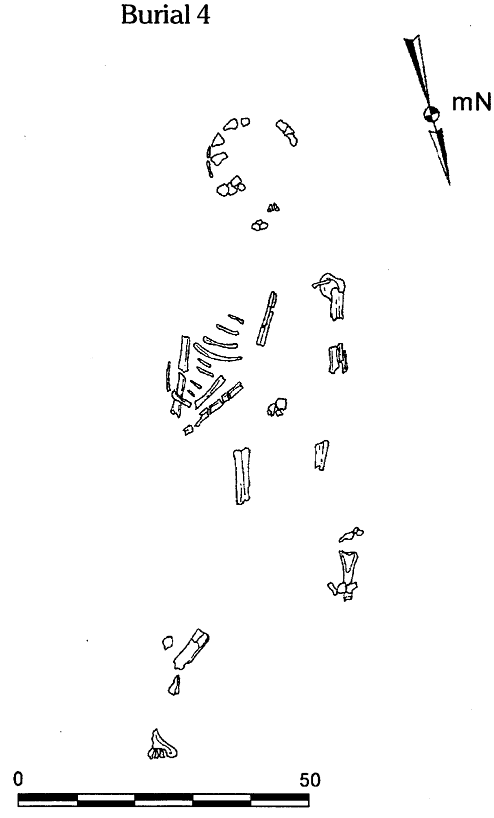
CA-CCO-696
Burial 3



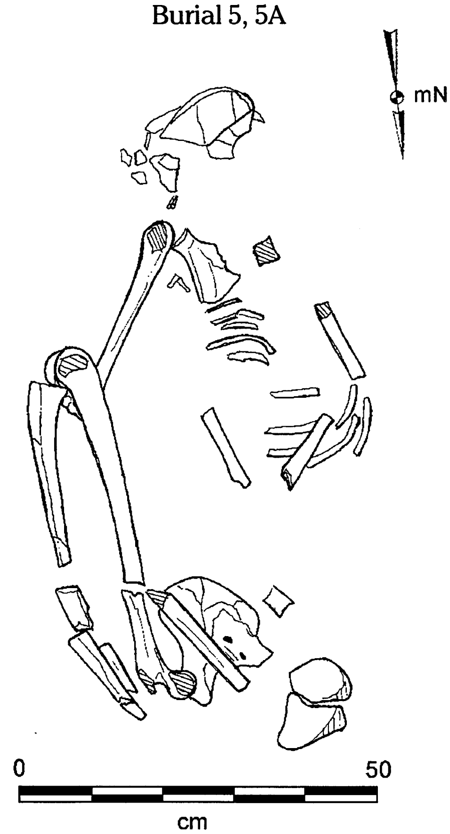
CA-CCO-696
Burial 4



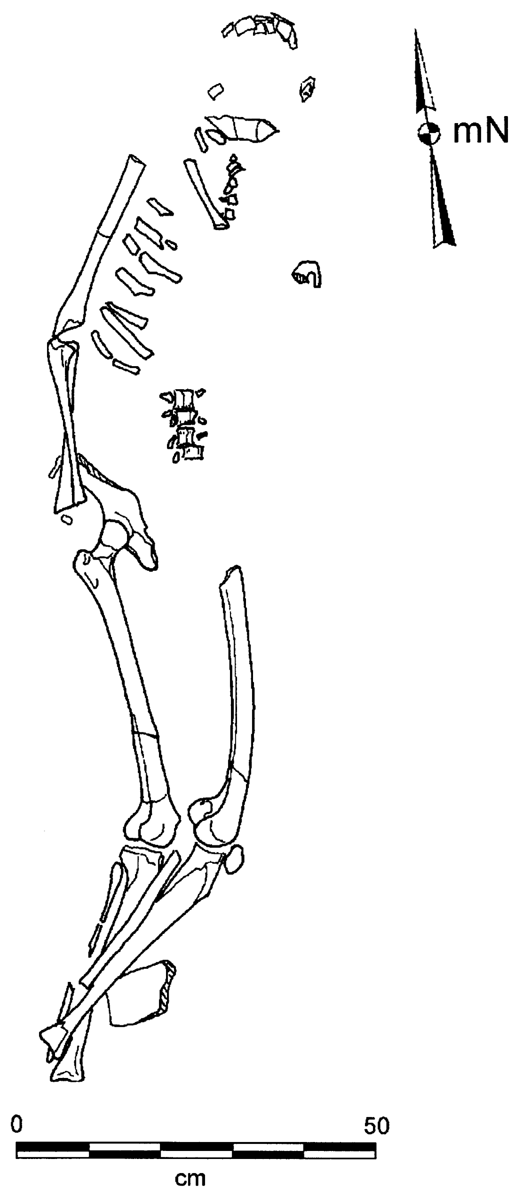
CA-CCO-696
Burial 5, 5A



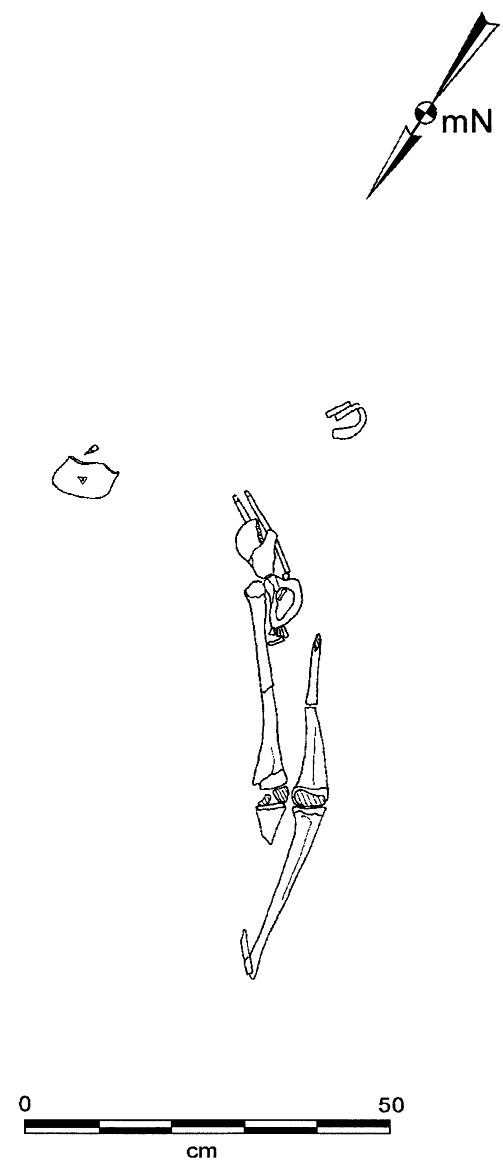
CA-CCO-696
Burial 6



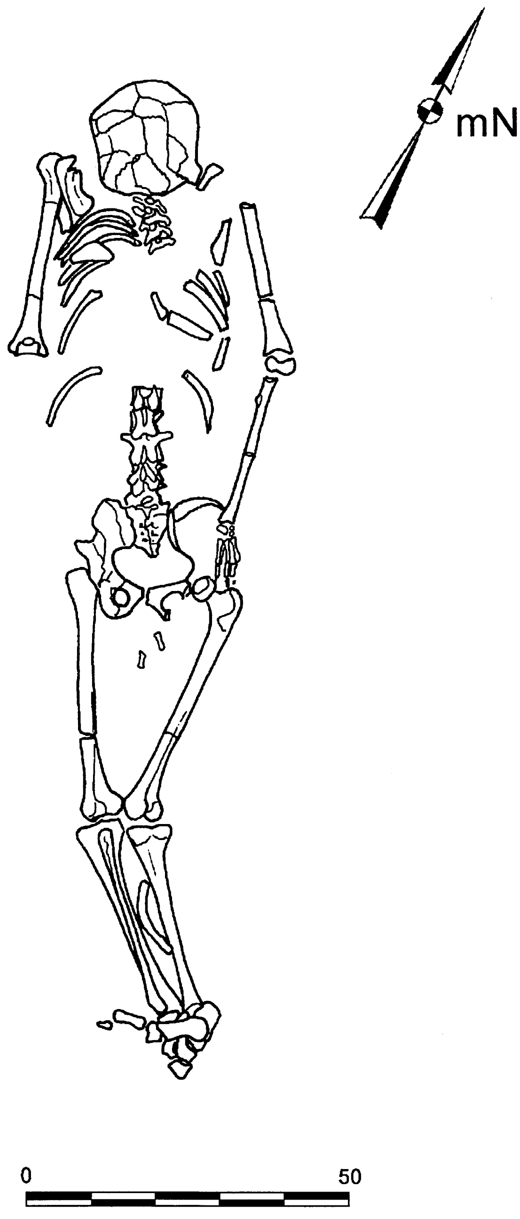
CA-CCO-696
Burial 7



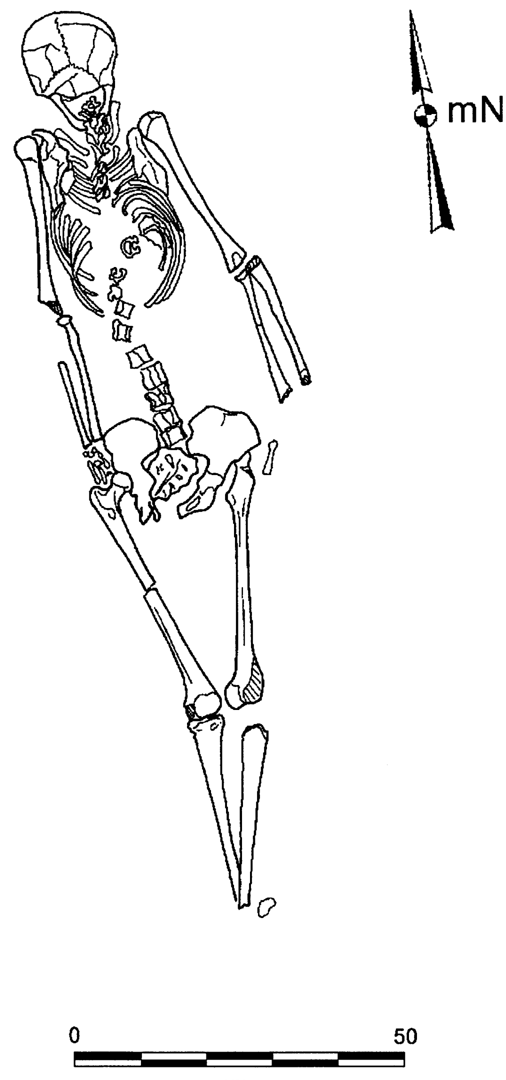
CA-CCO-696
Burial 8



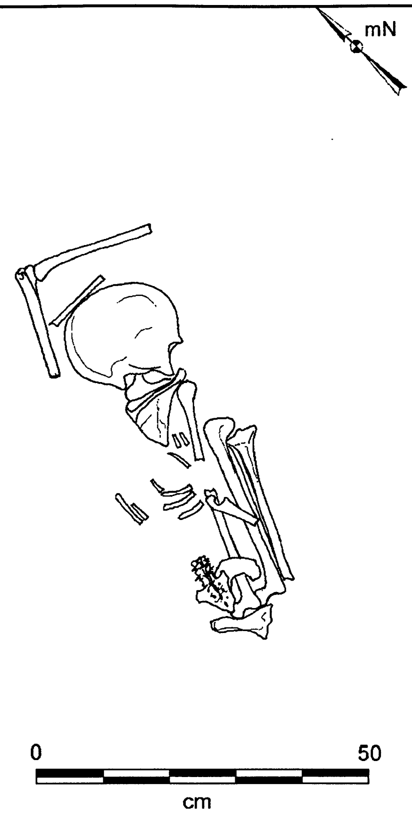
CA-CCO-696
Burial 9



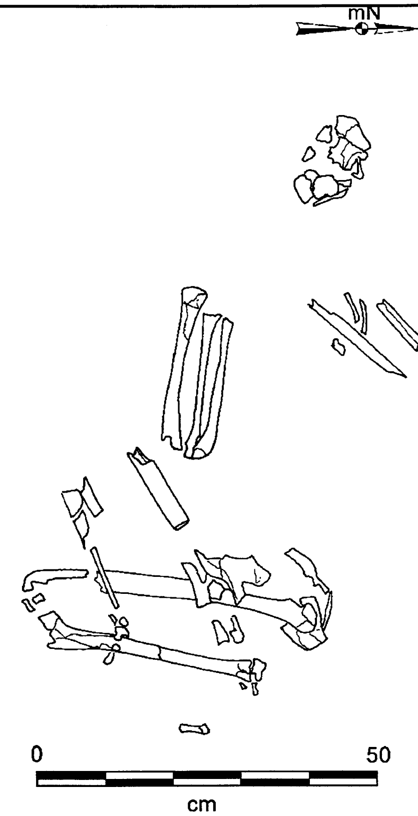
CA-CCO-696
Burial 10



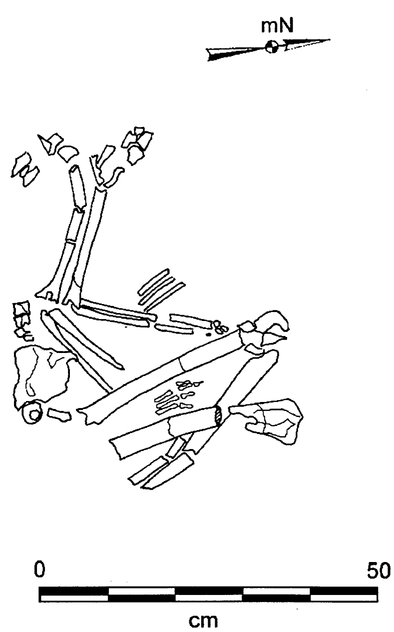
CA-CCO-696
Burial 11



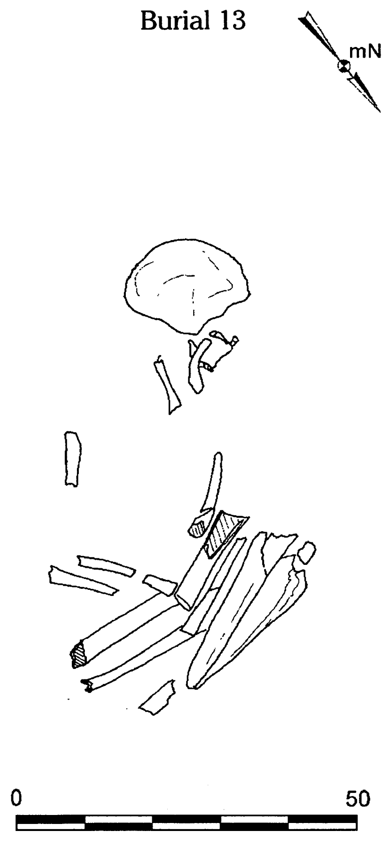
CA-CCO-696
Burial 12



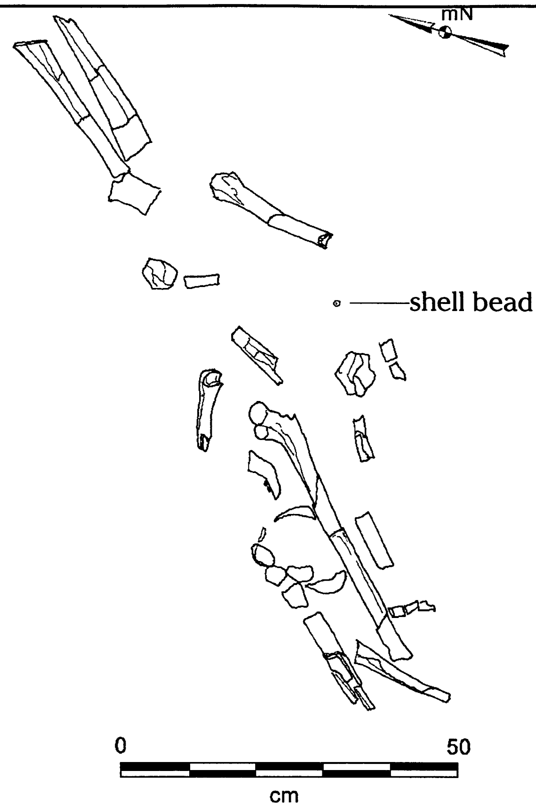
CA-CCO-696
Burial 13



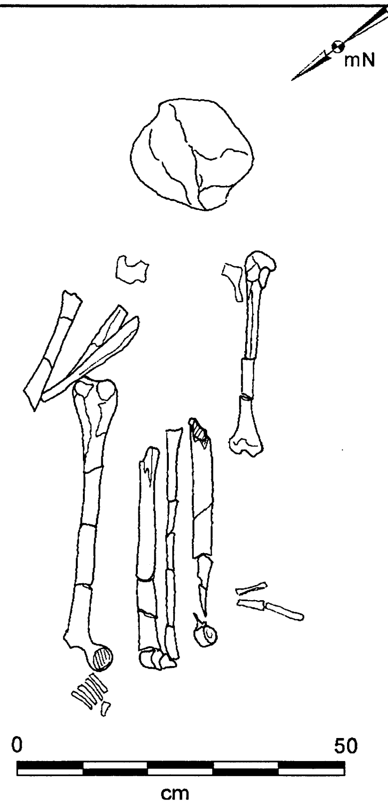
CA-CCO-696
Burial 14



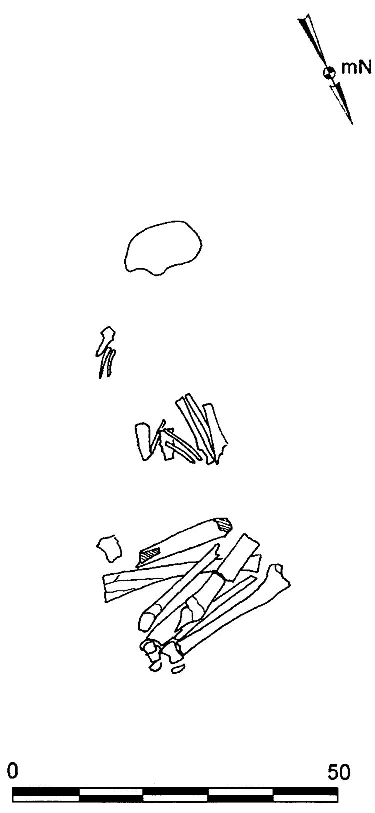
CA-CCO-696
Burial 15



CA-CCO-696
Burial 16



CA-CCO-696
Burial 17



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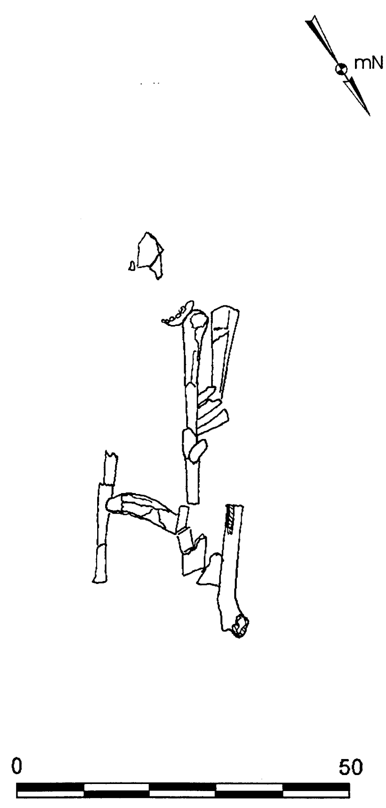

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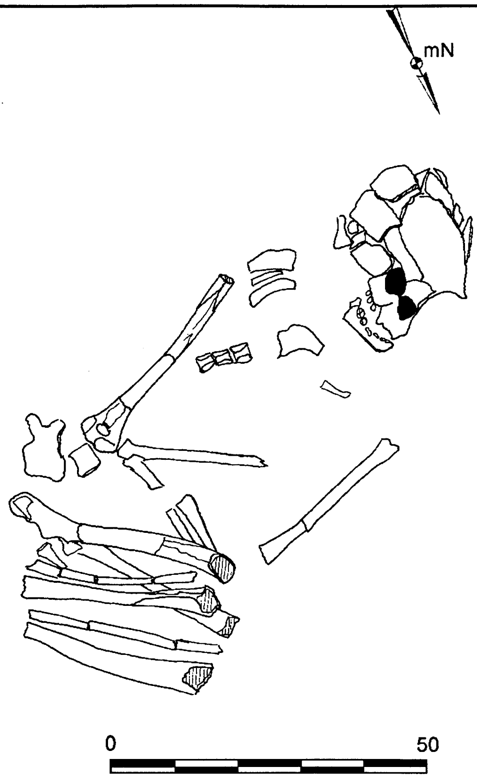

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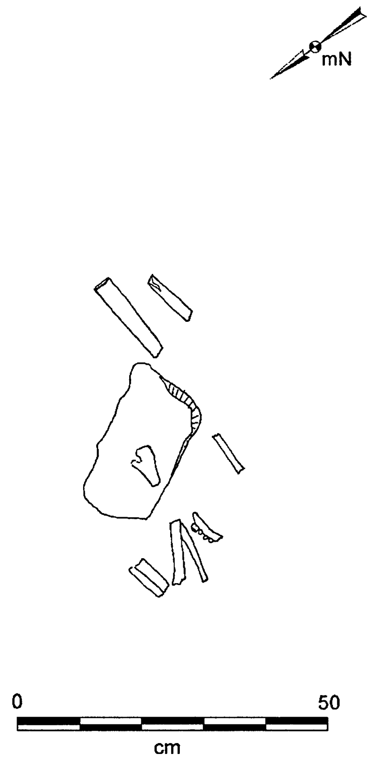

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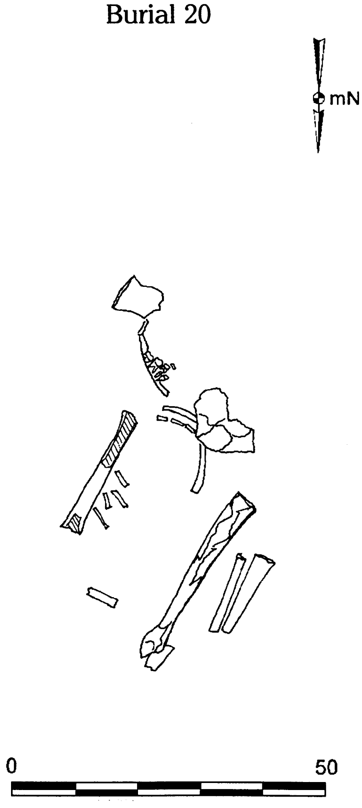

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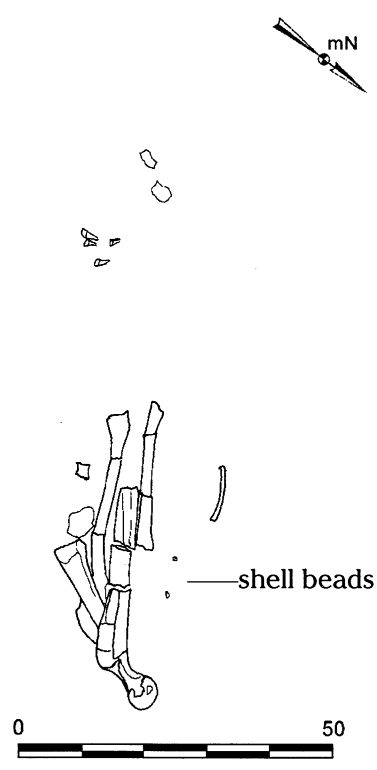

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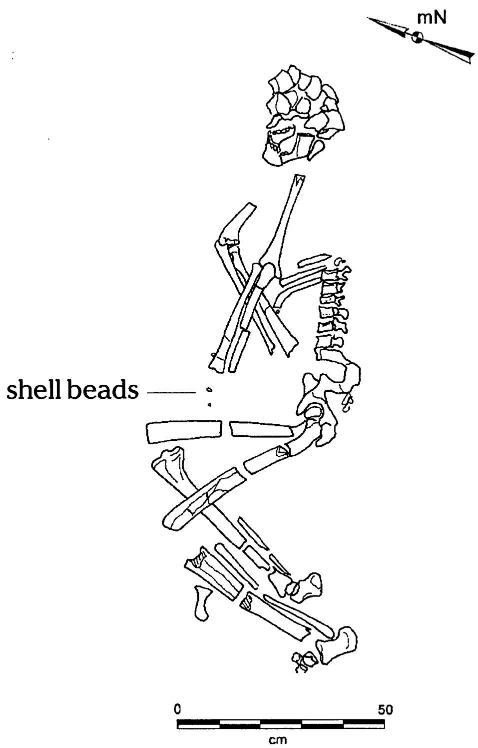

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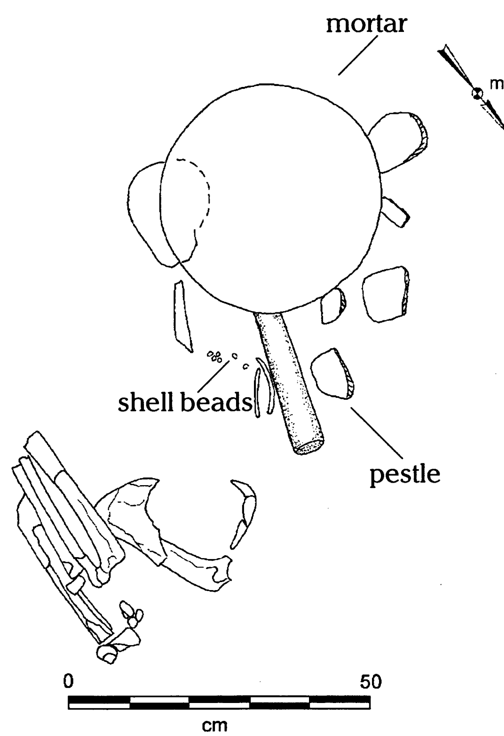

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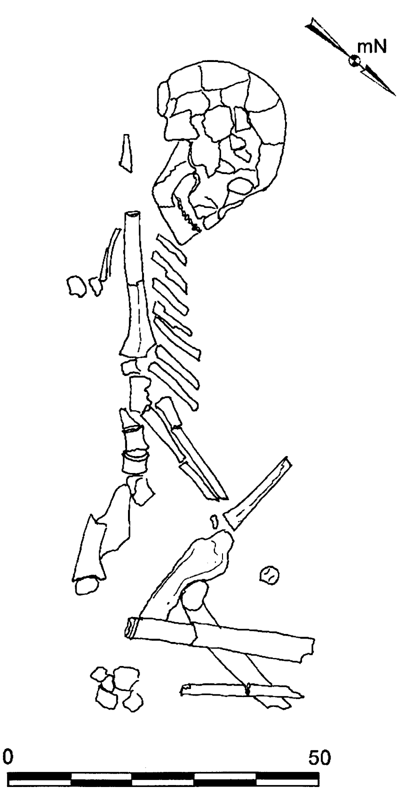

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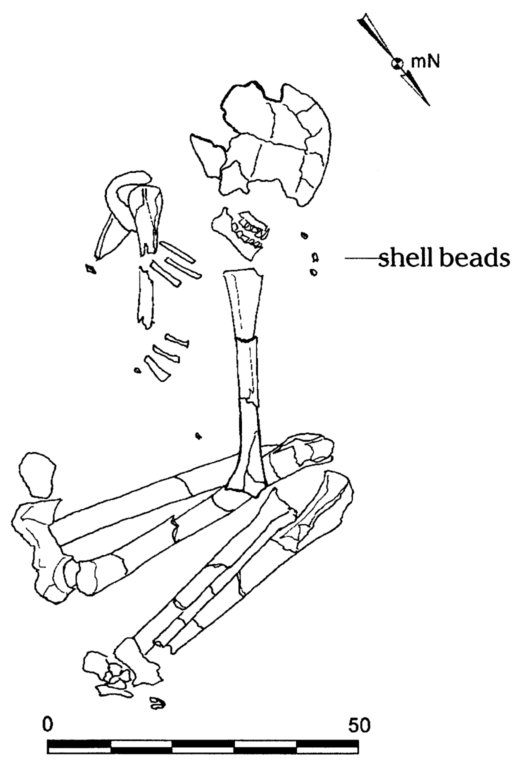

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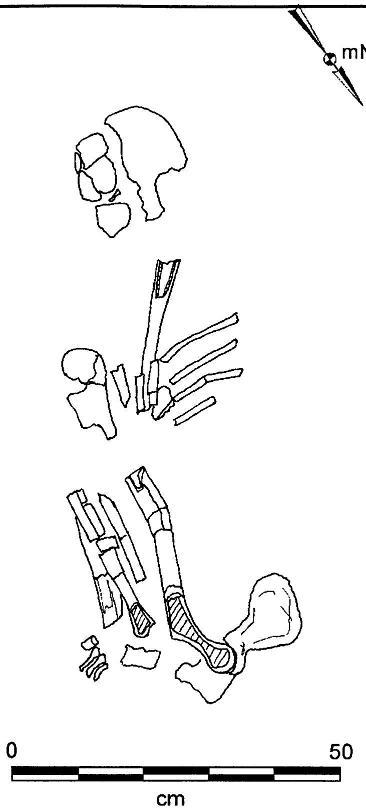

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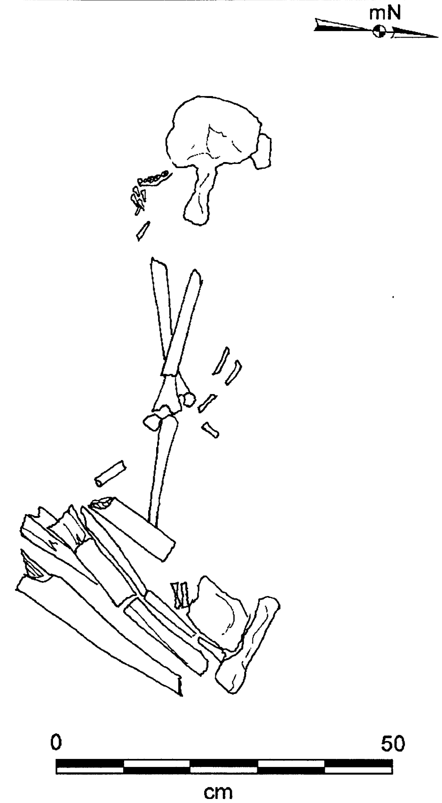

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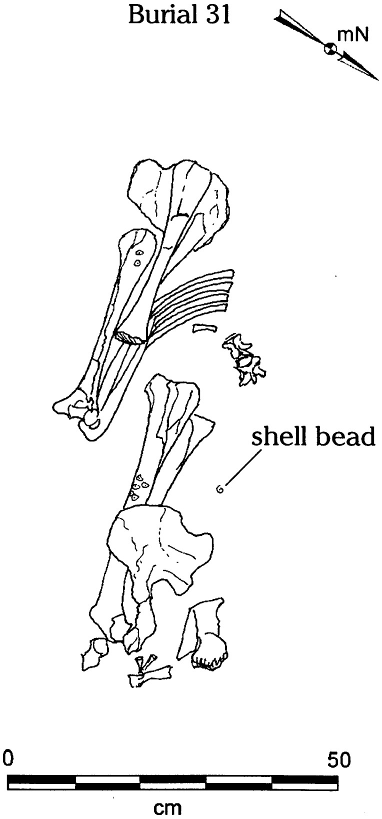

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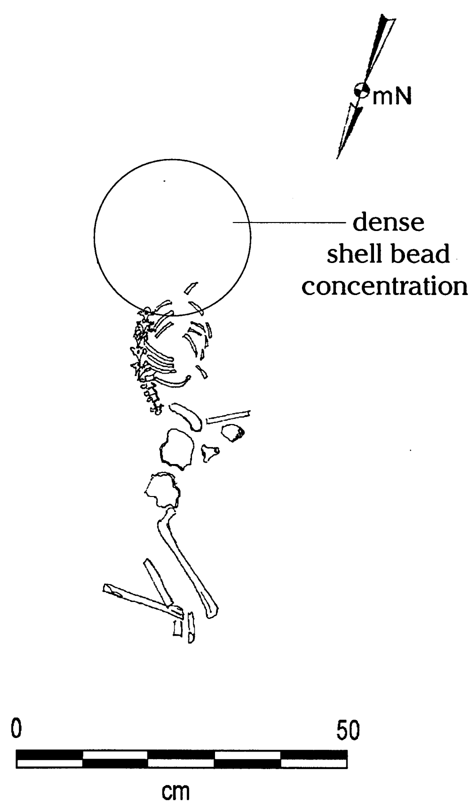

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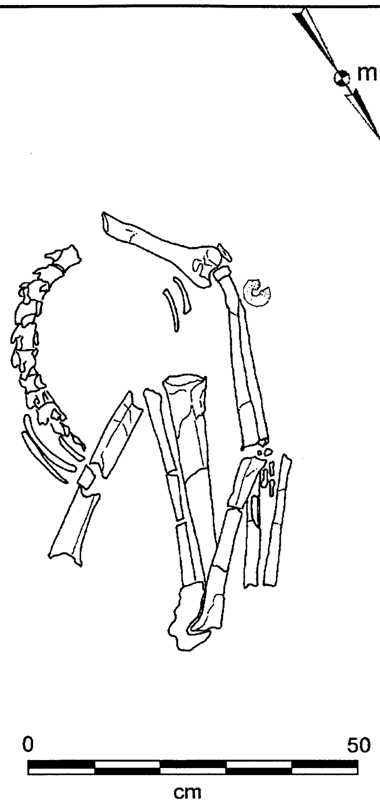

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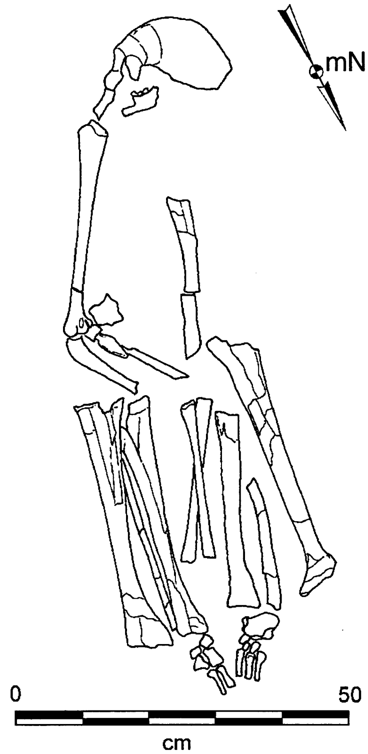

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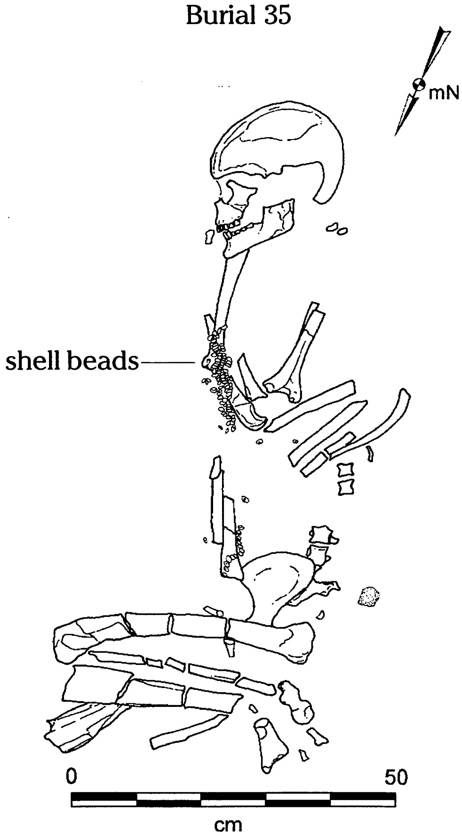

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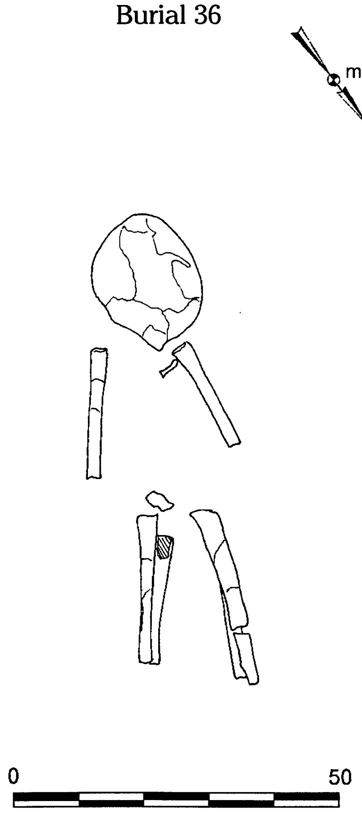

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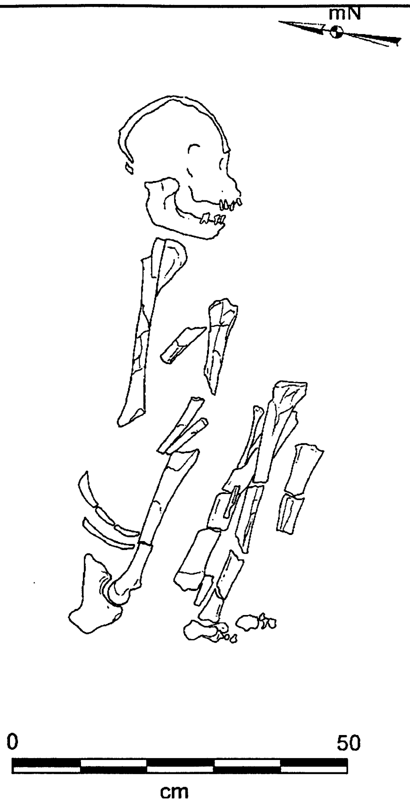

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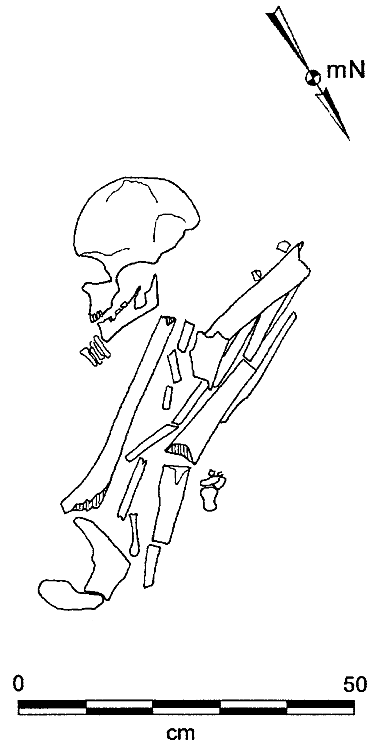

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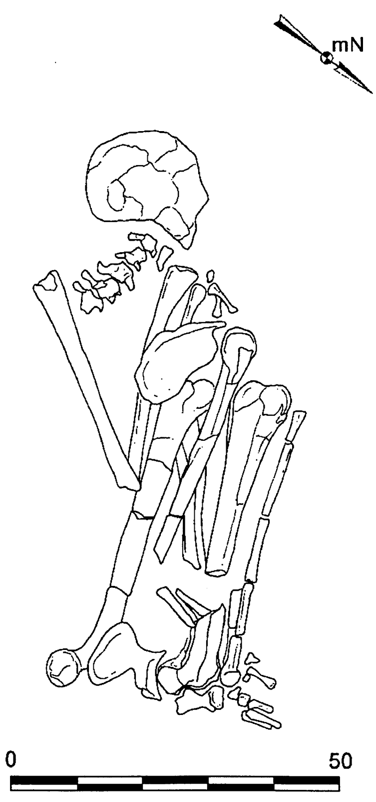

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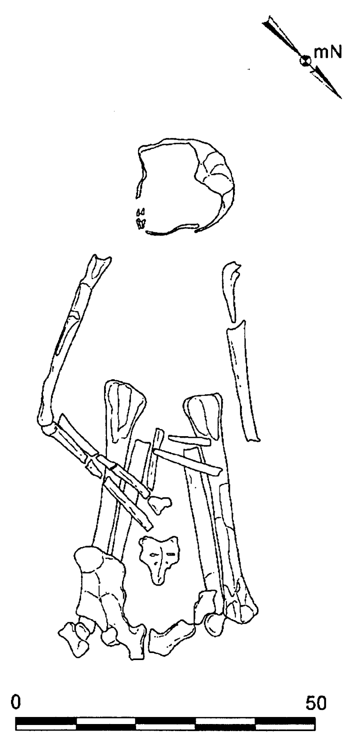

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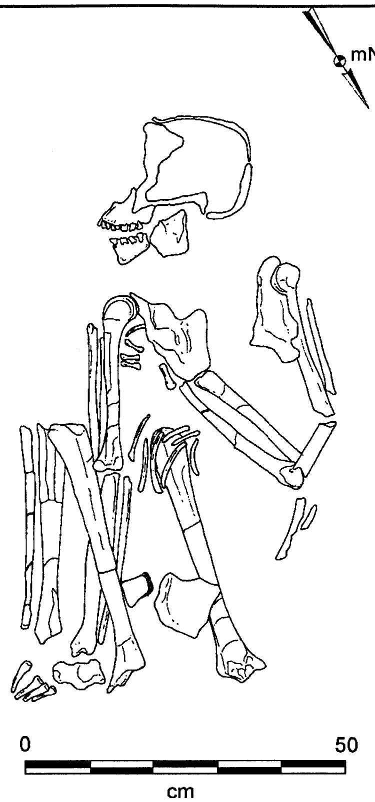

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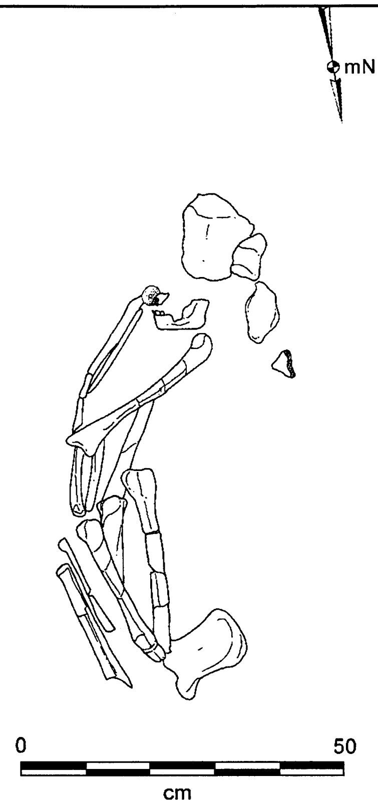

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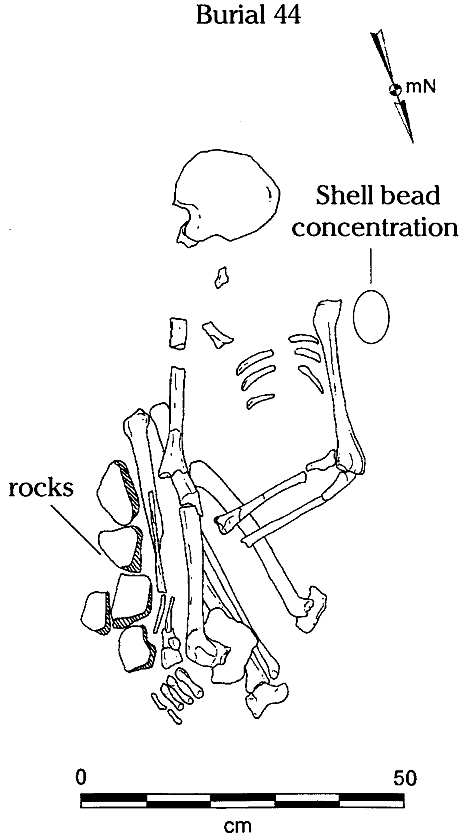

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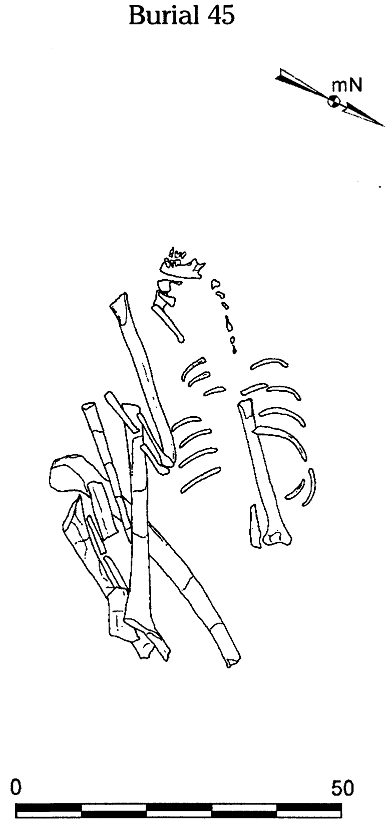

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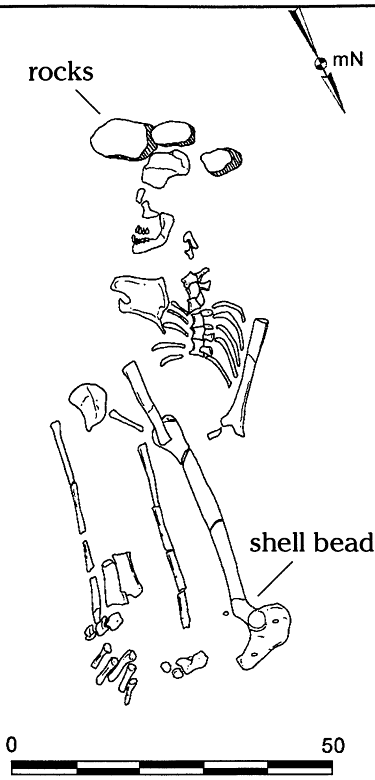

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Burial 48

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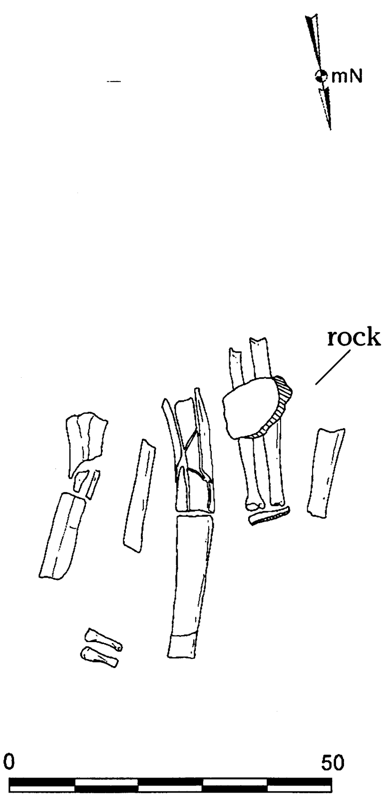

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Burial 50

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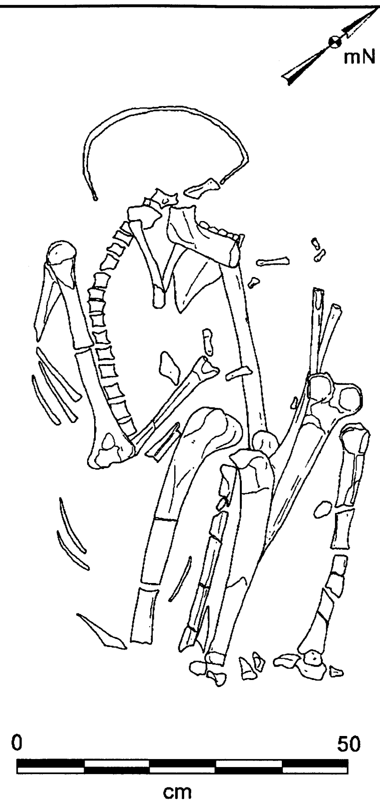

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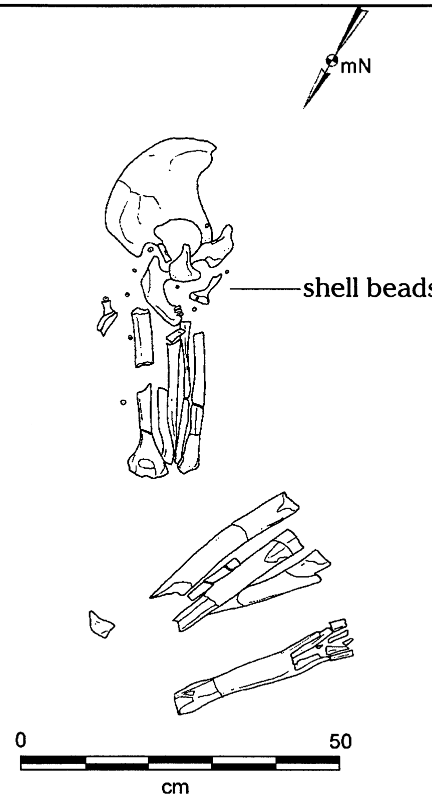

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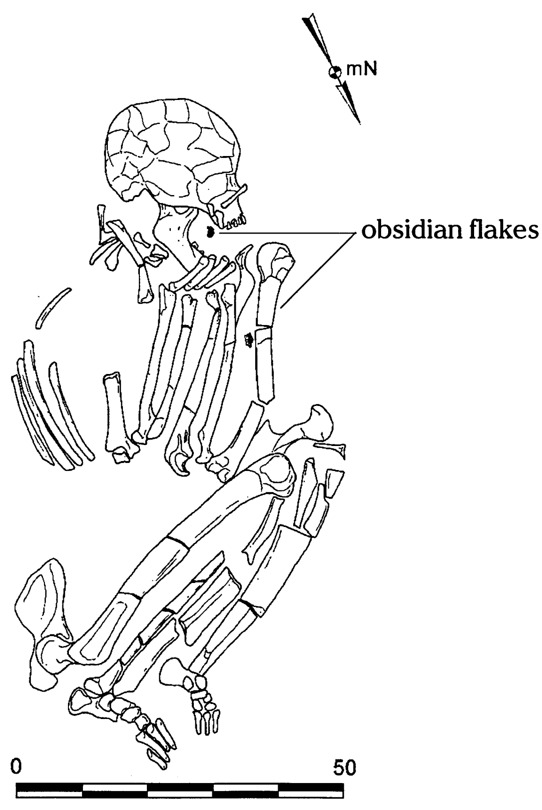

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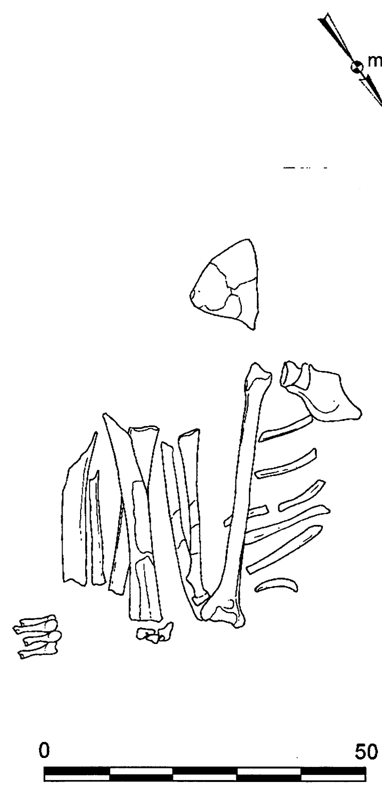

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Burial 55

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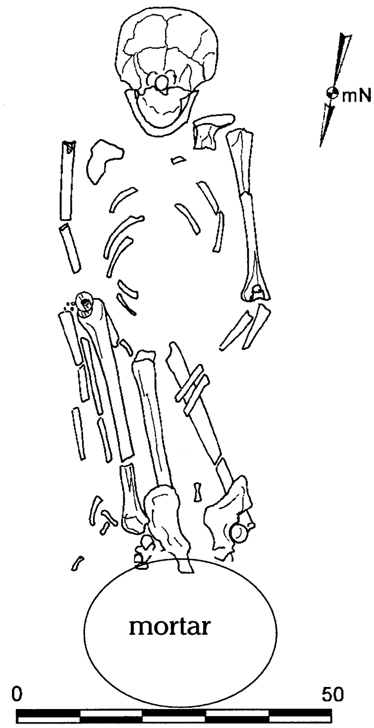
Burial 56



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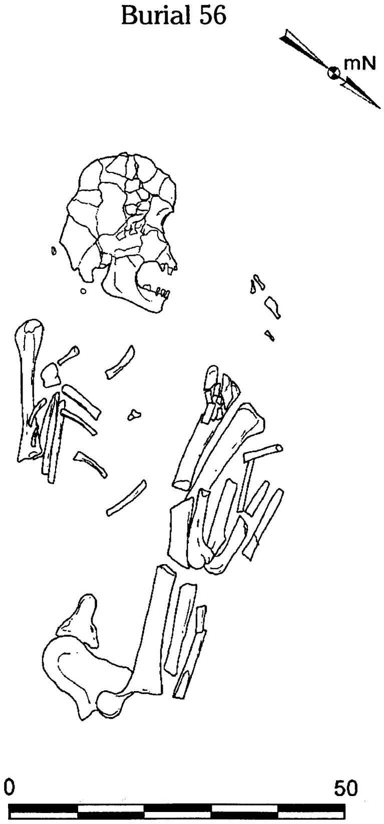

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Burial 58

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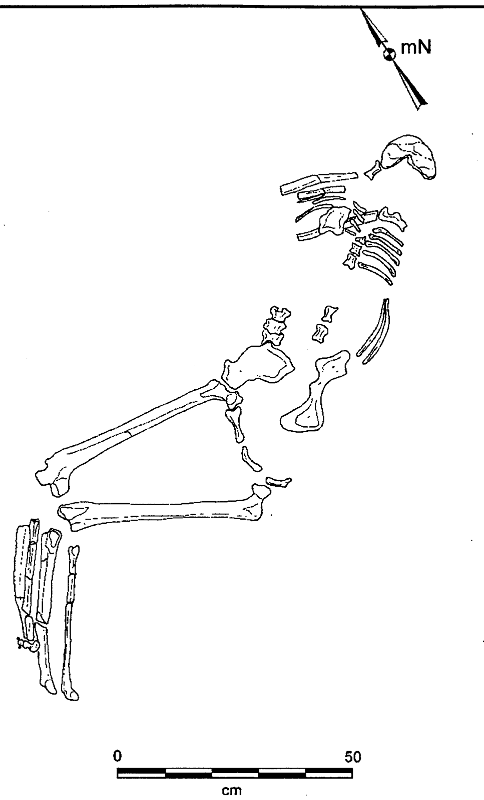
Burial 59



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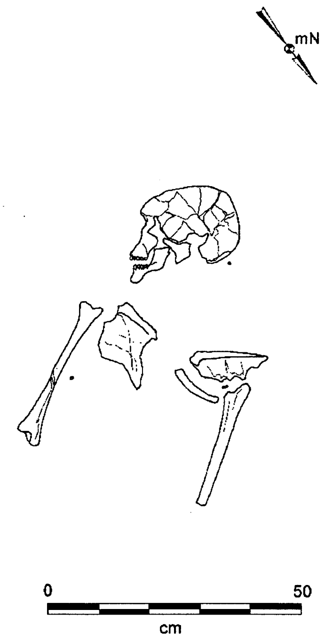

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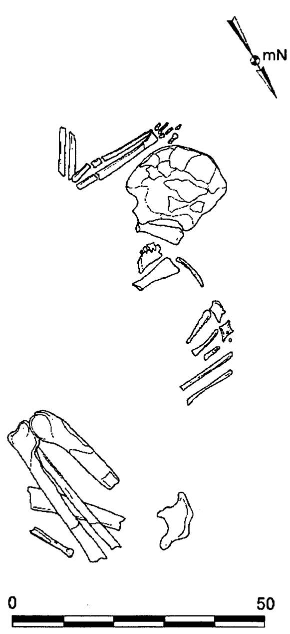

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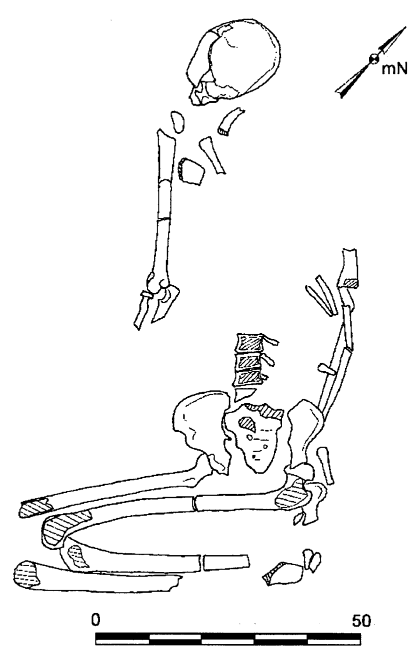

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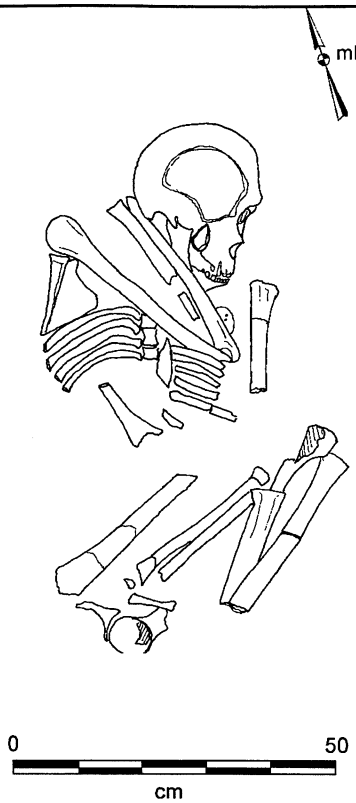

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Burial 65

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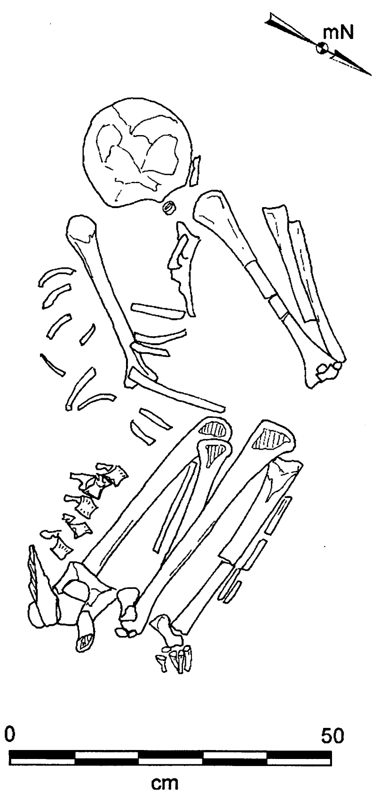
Burial 67



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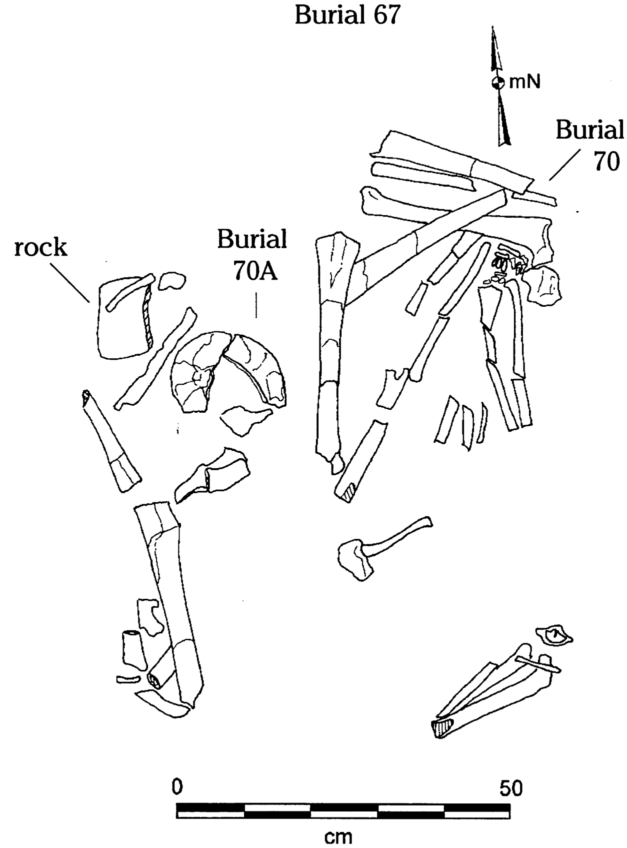

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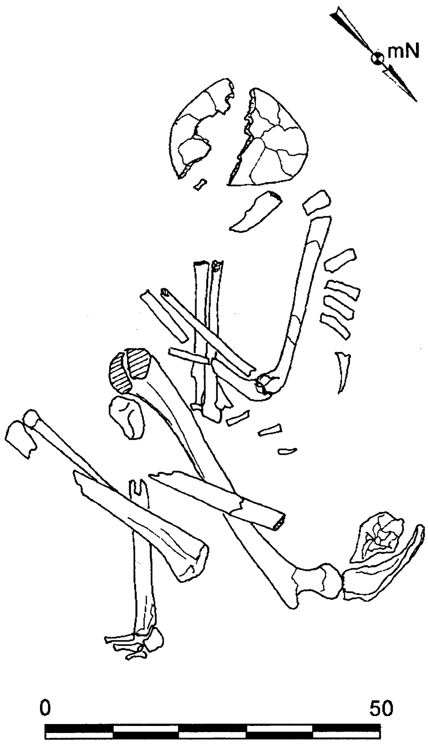

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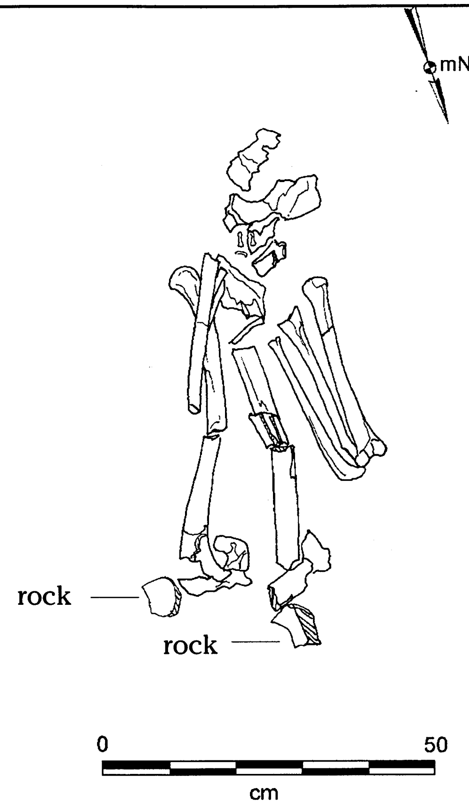

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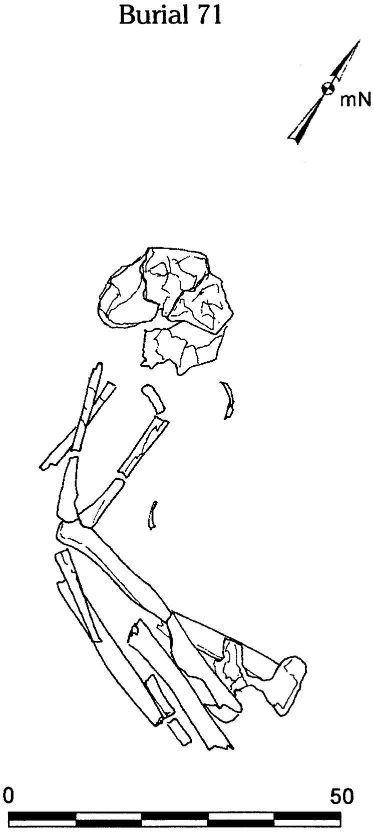

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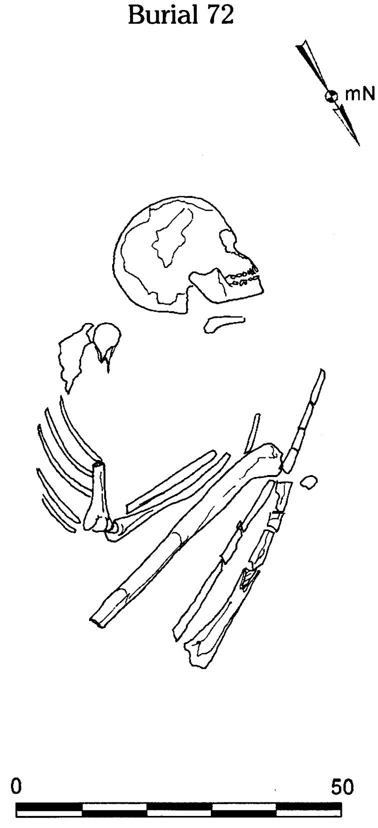

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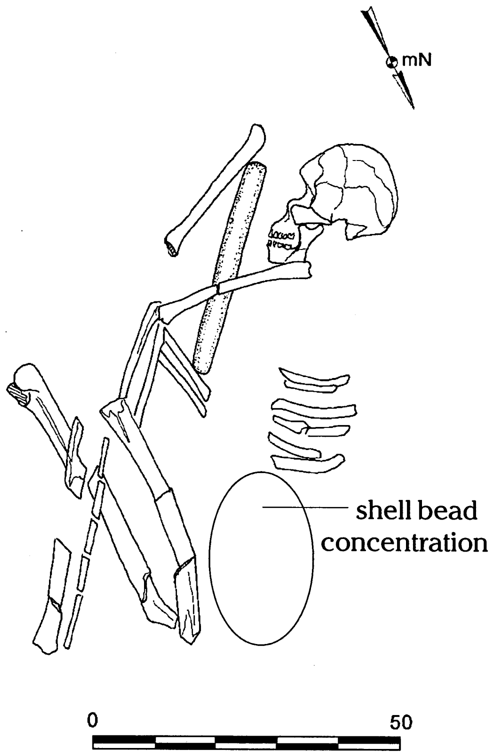

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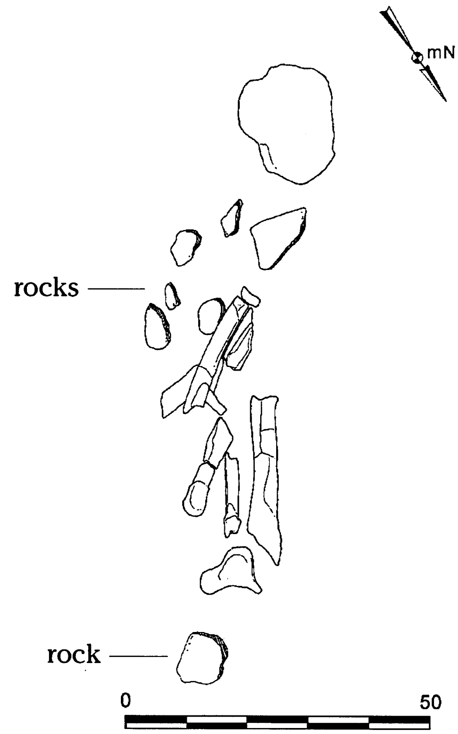

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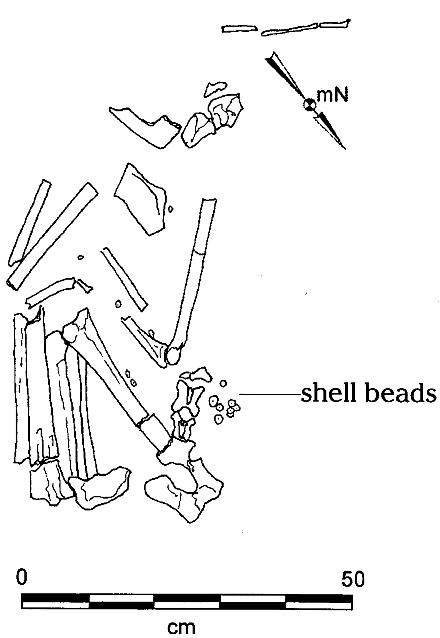

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Burial 78

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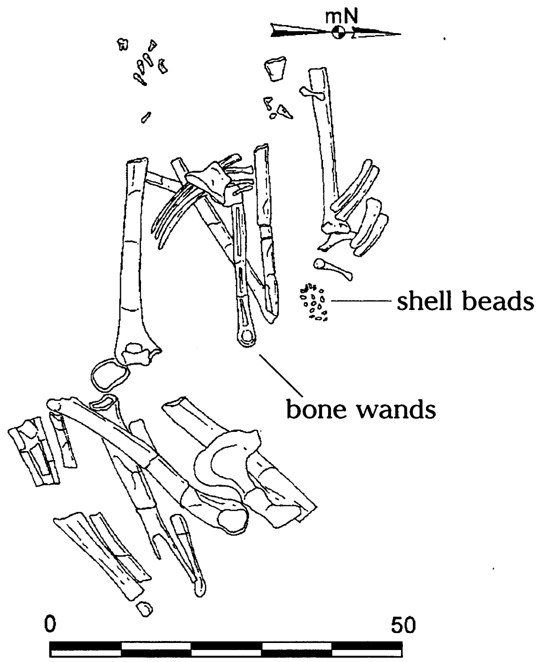

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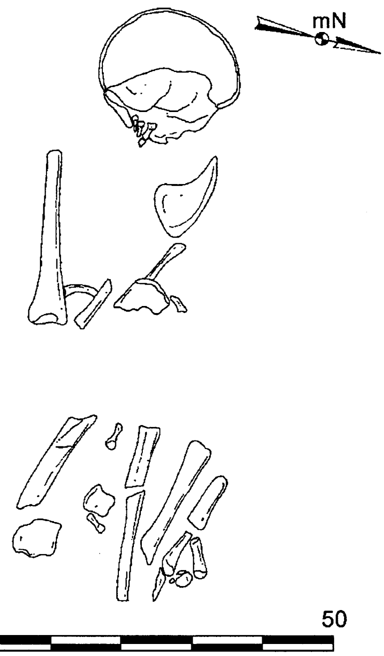

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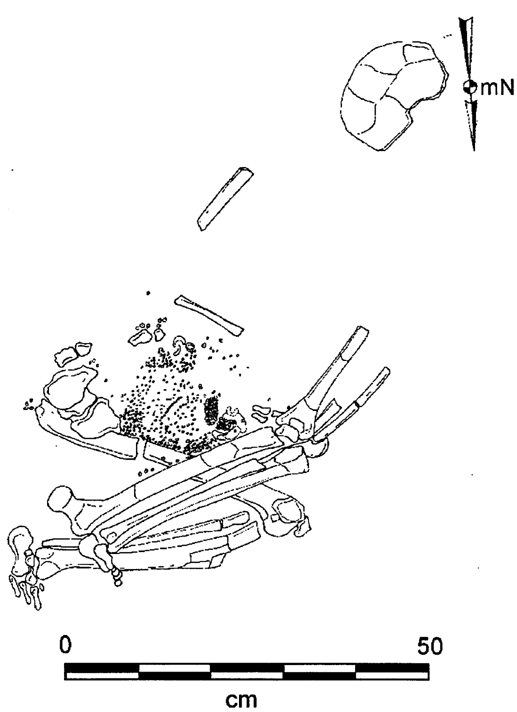

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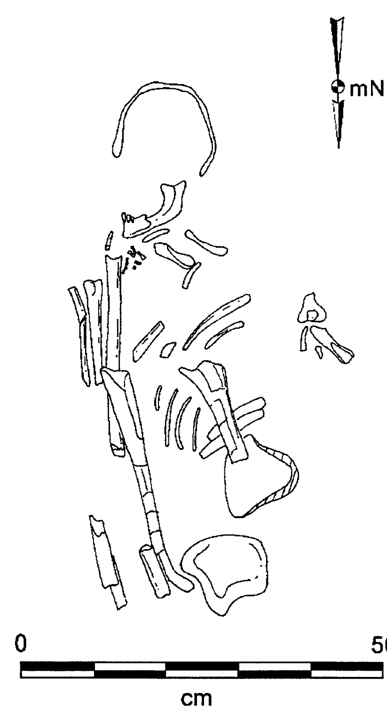

CA-CCO-696
Burial 84

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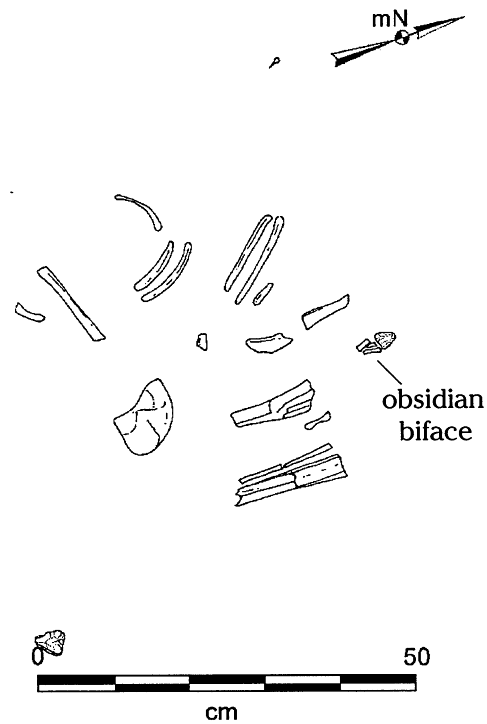
Burial 85



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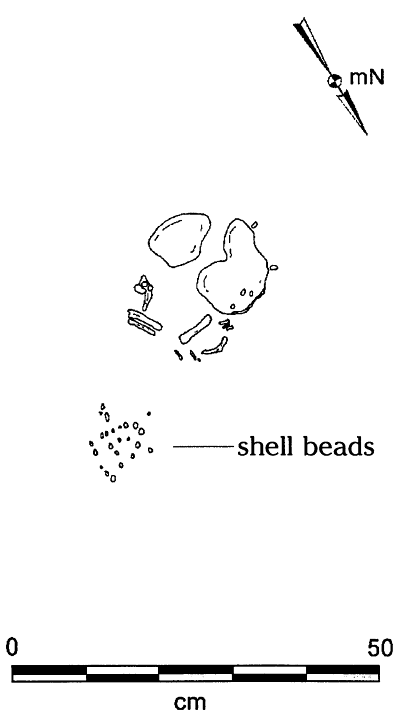

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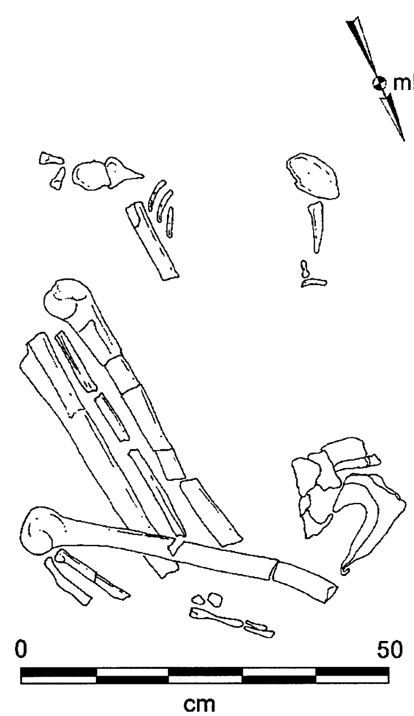

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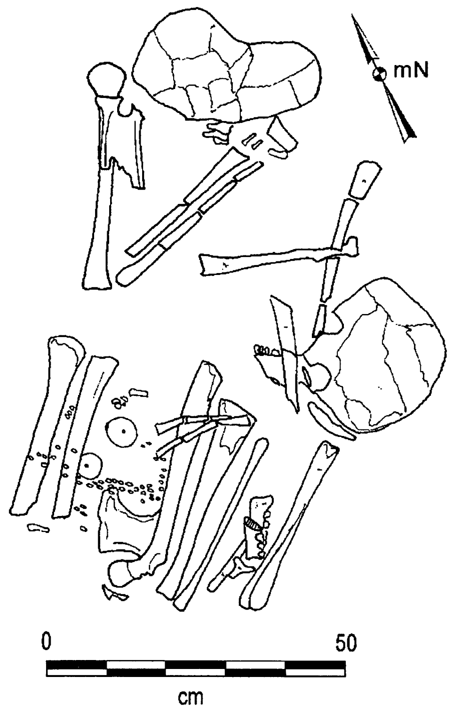

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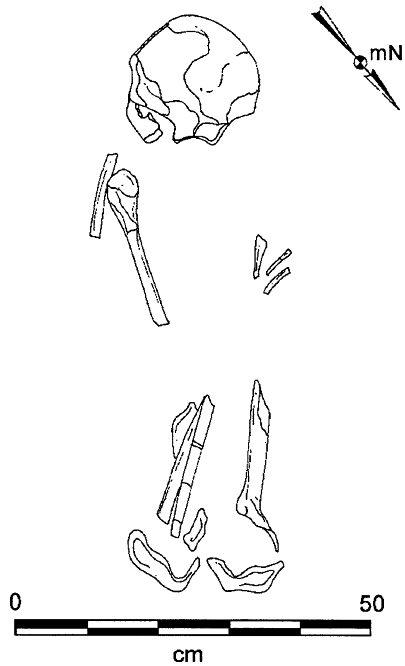

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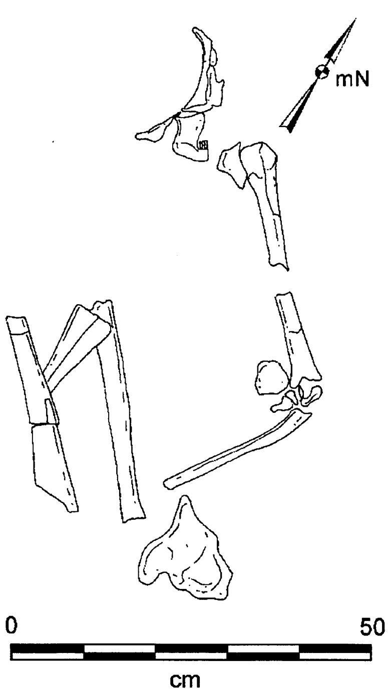

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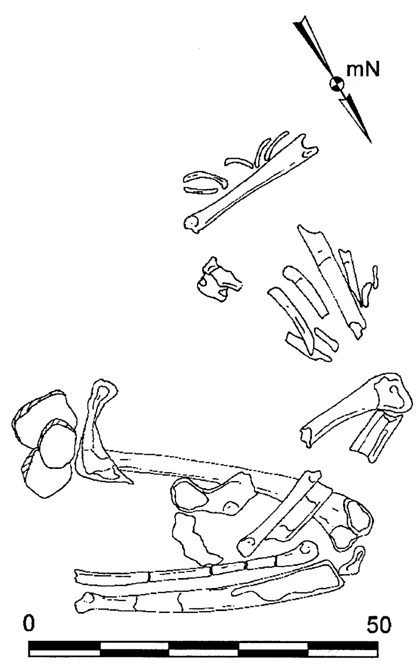

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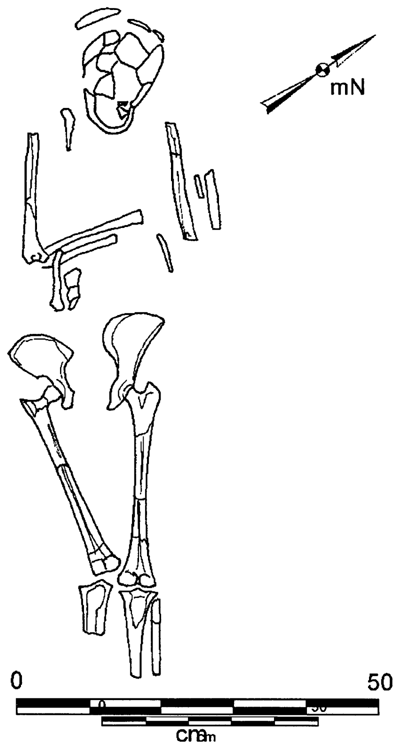

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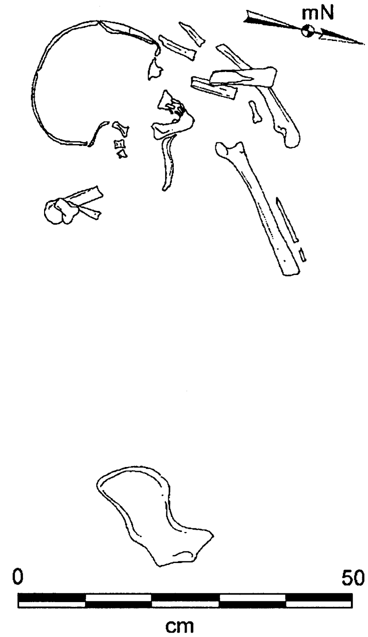

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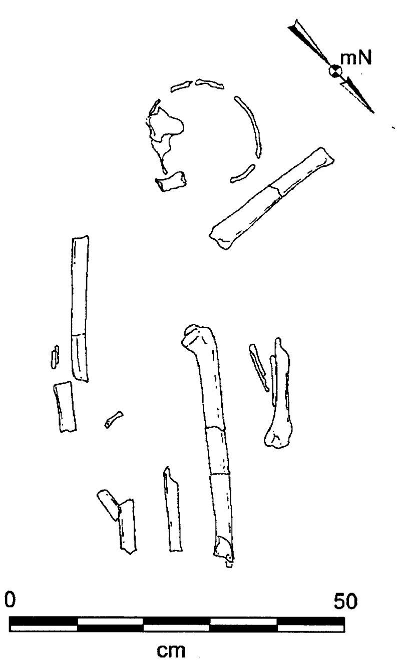

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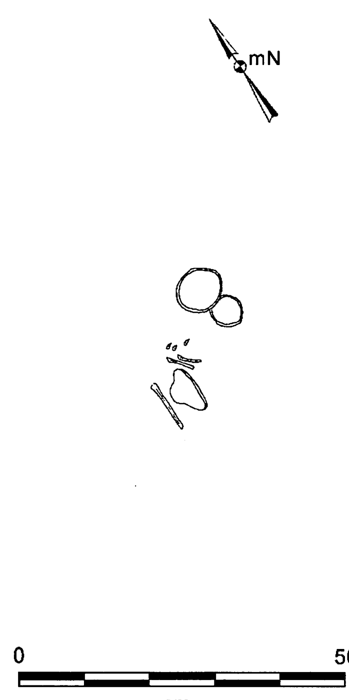

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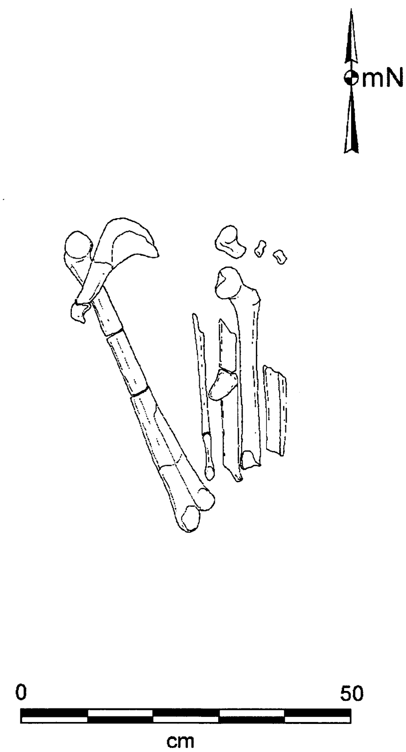

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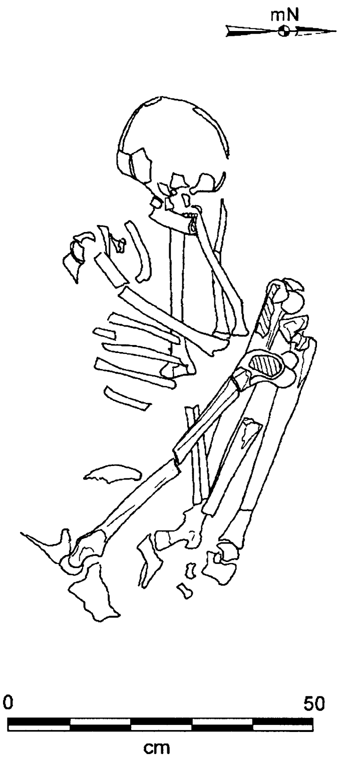

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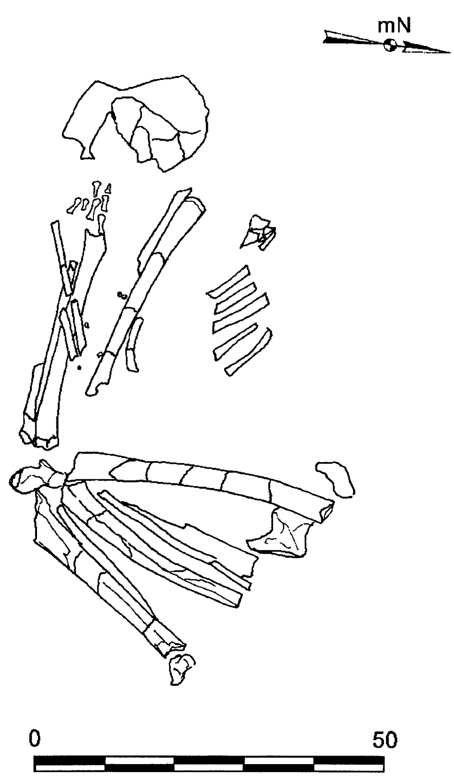

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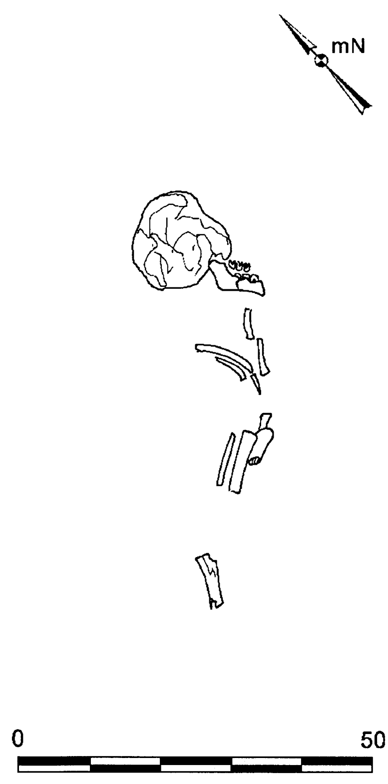

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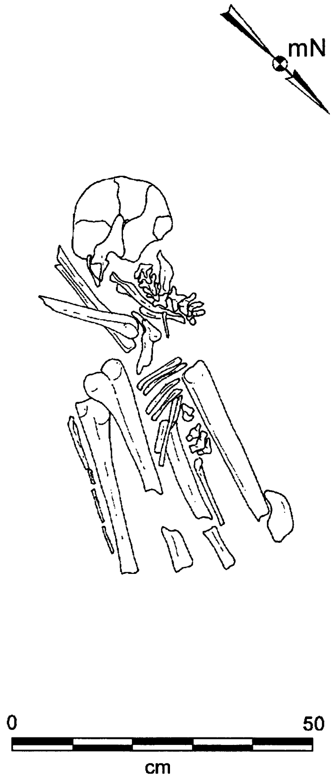

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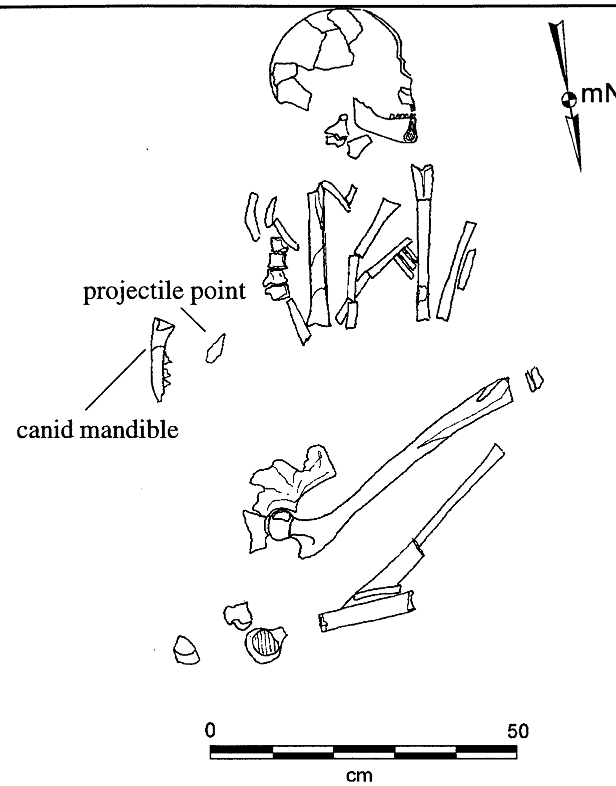

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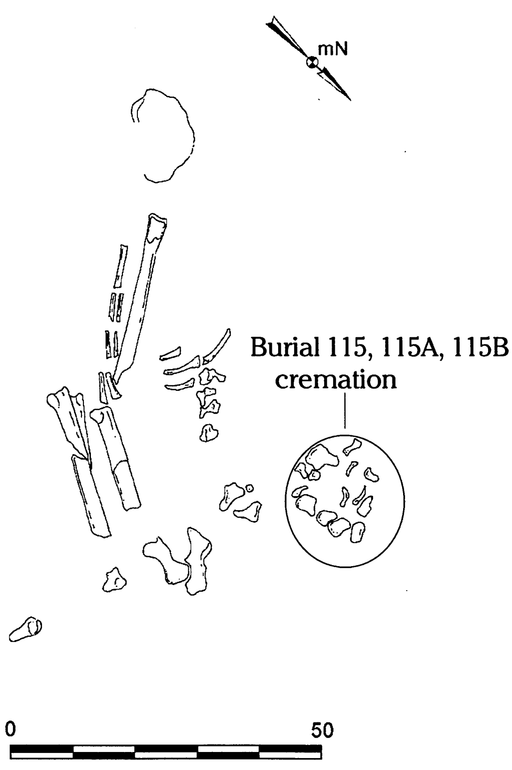

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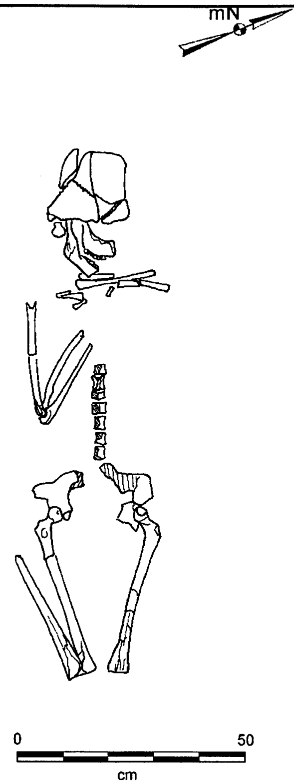

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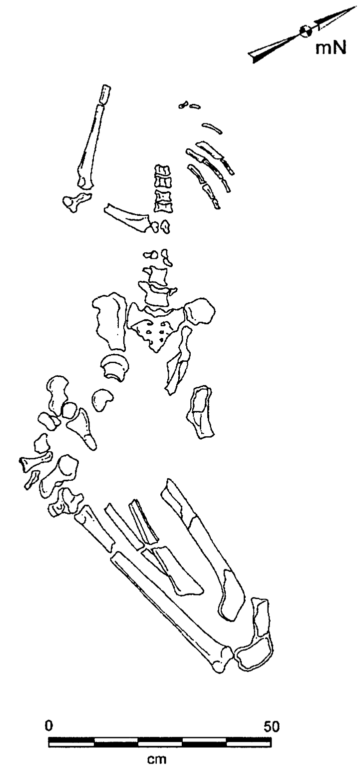

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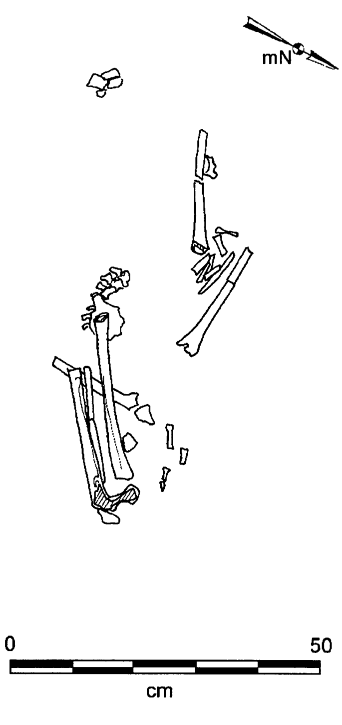

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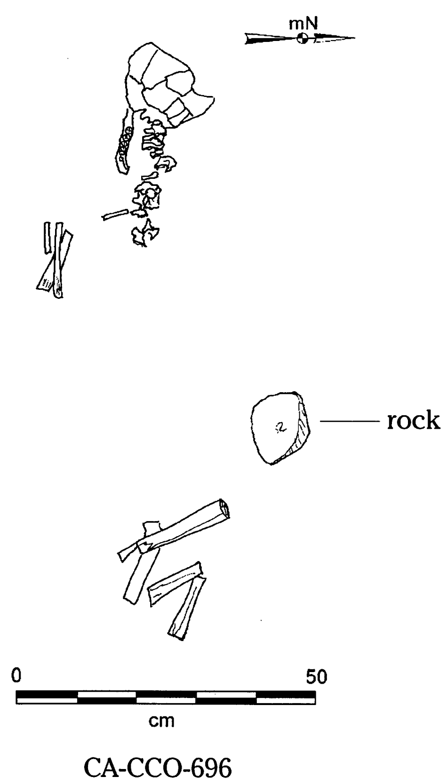

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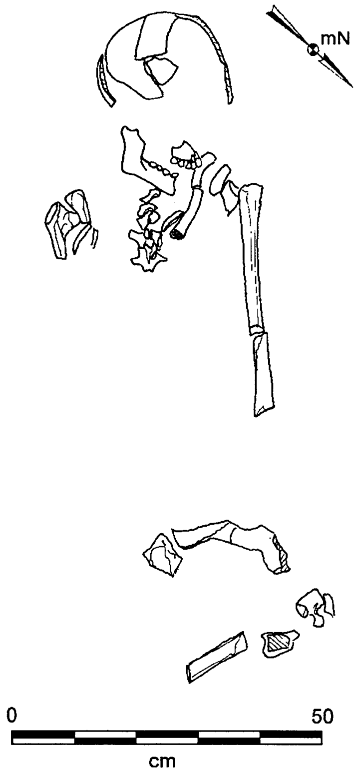

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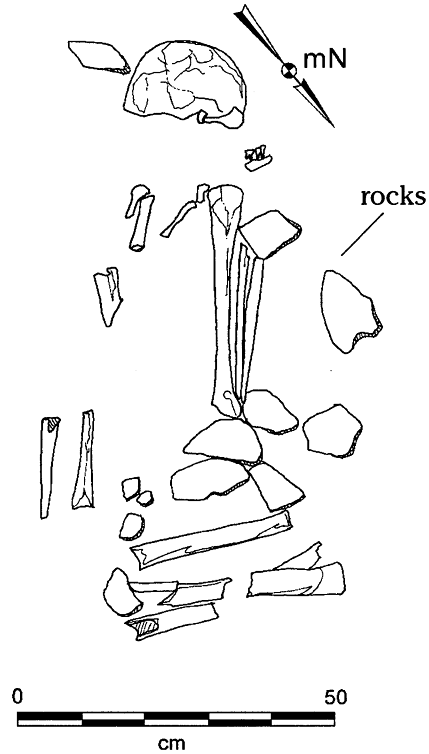

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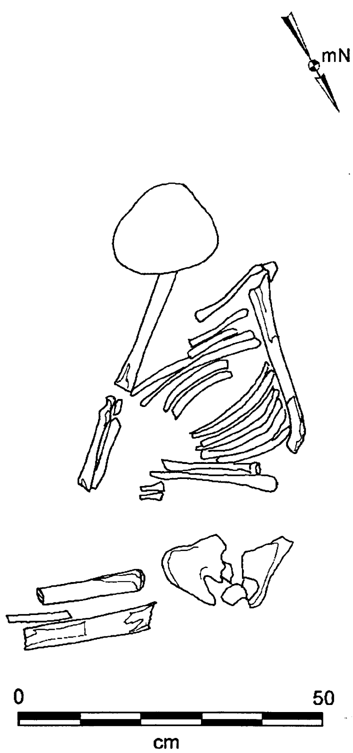

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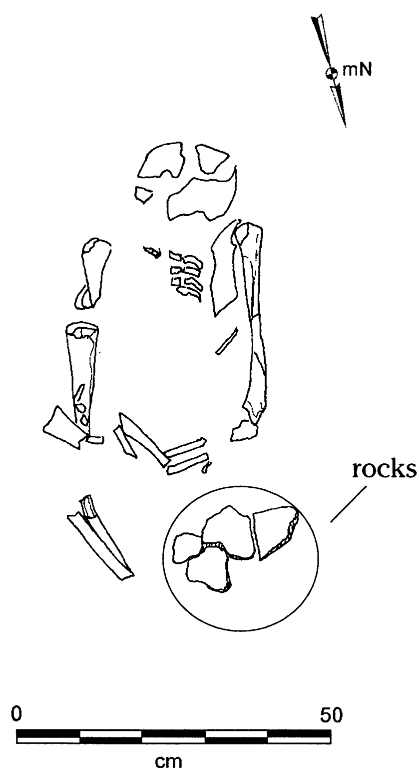

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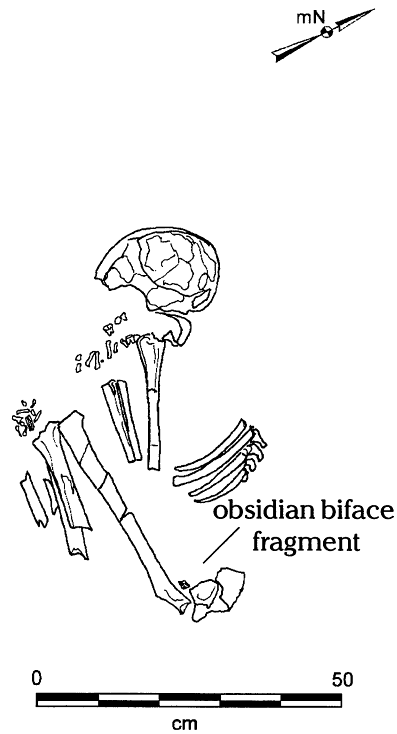

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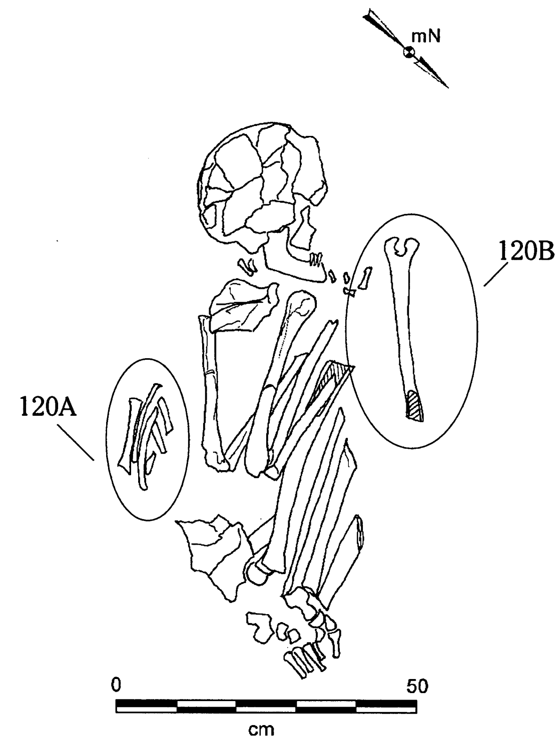

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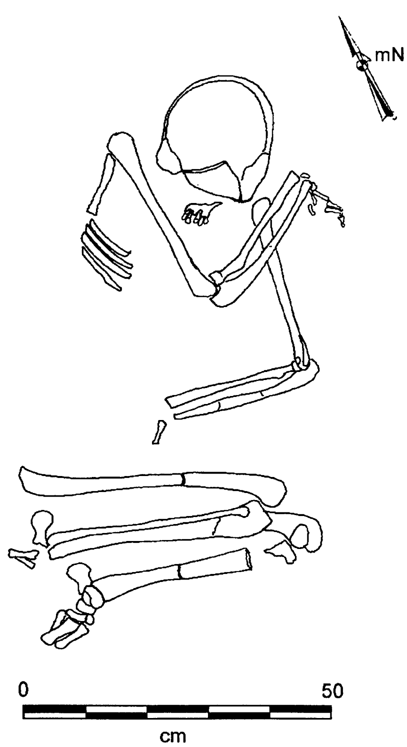

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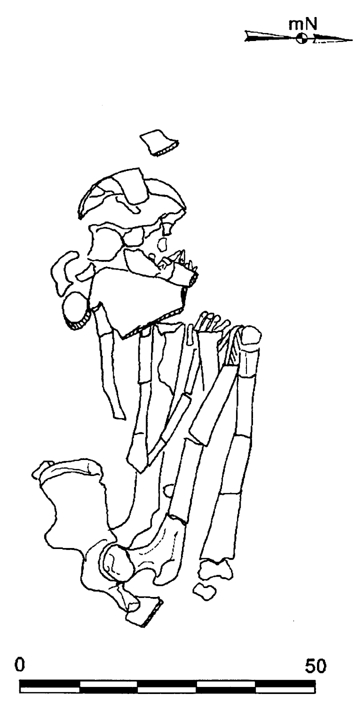

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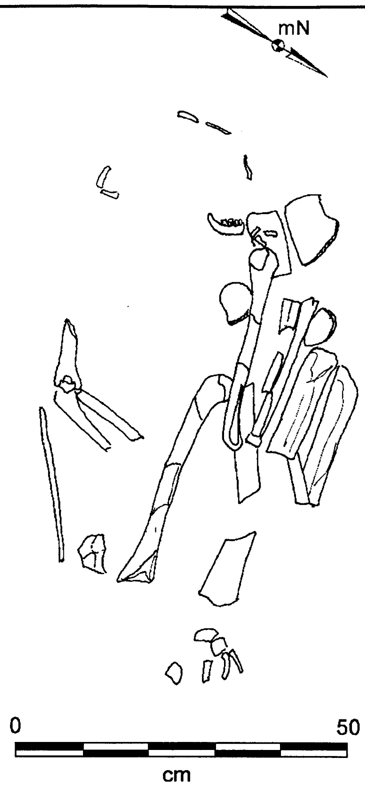

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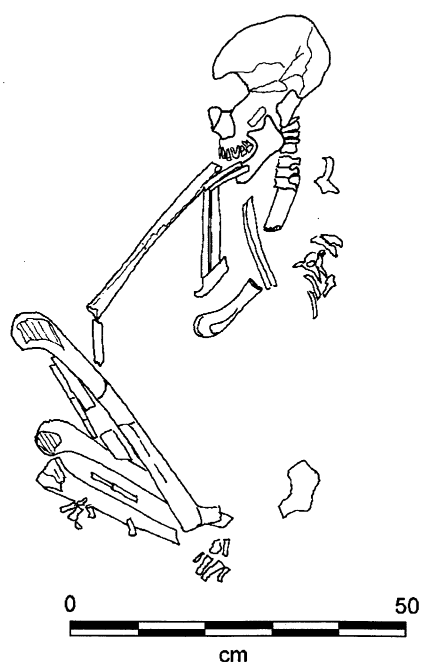

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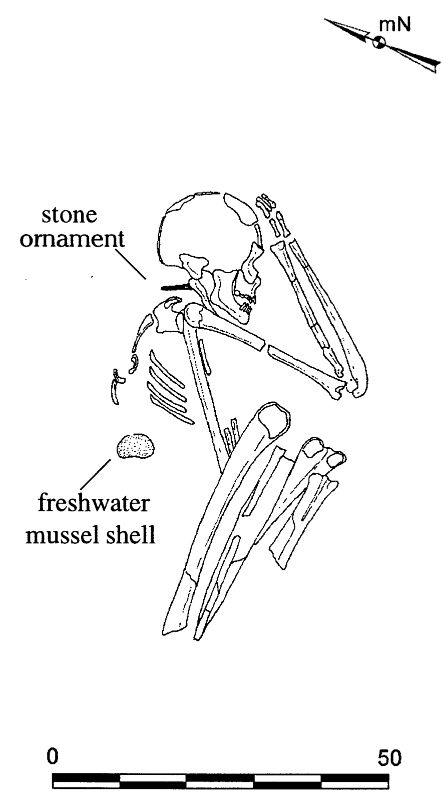

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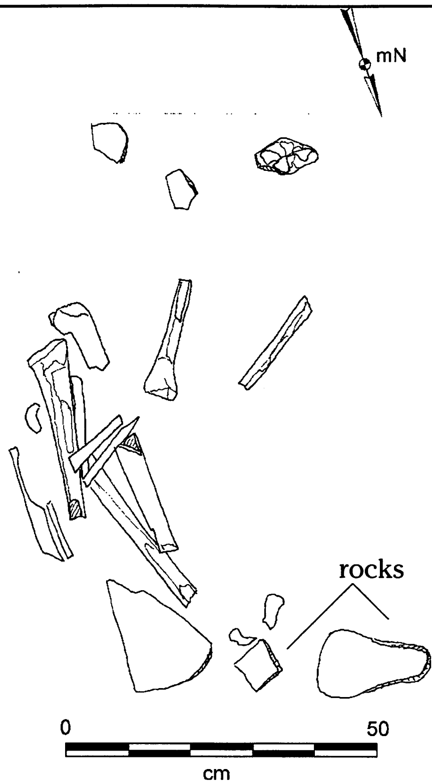

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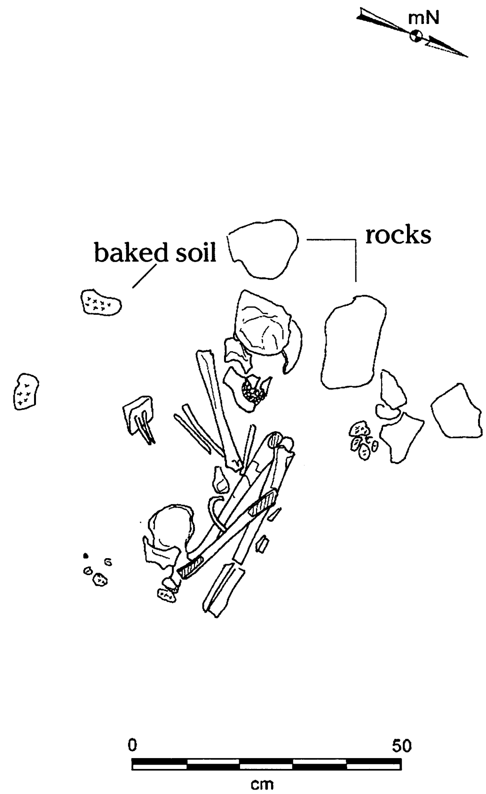

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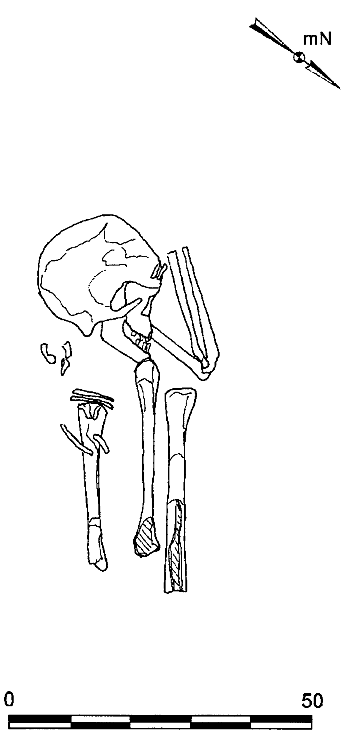

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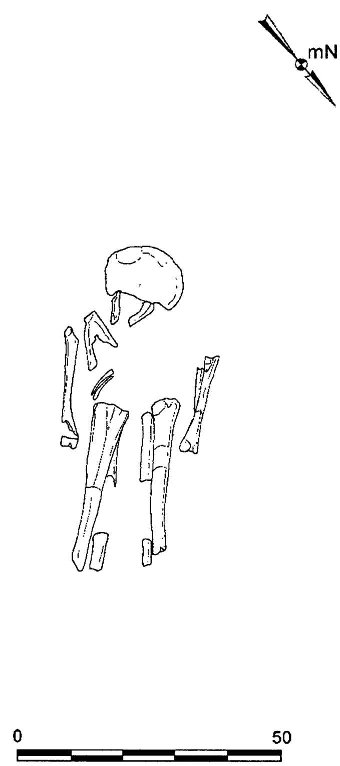

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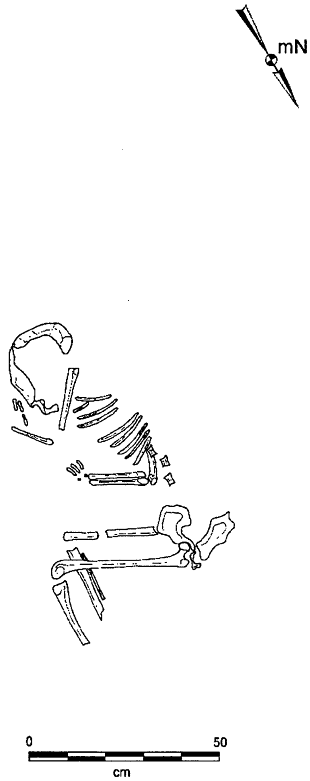

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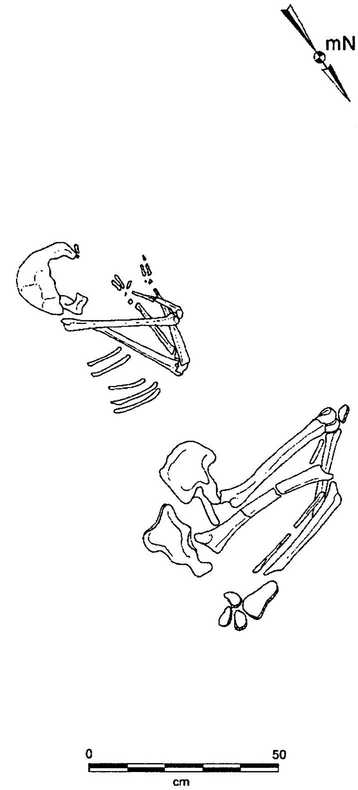

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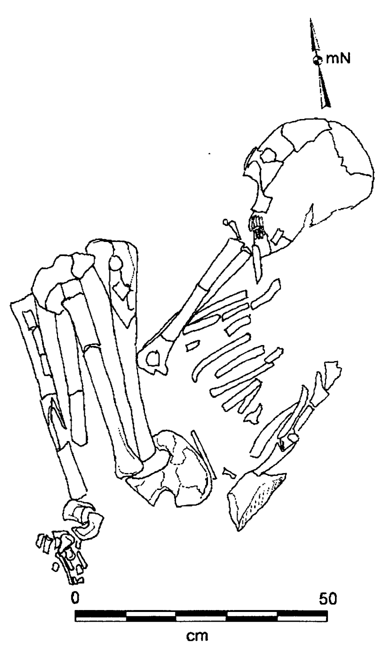

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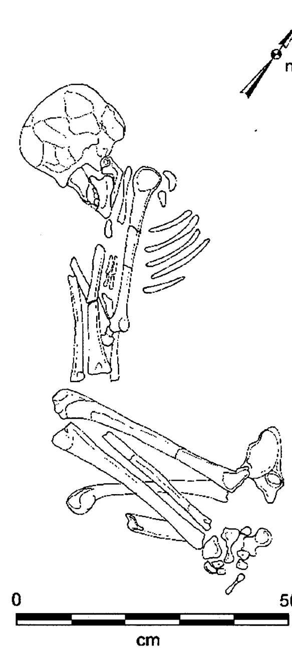

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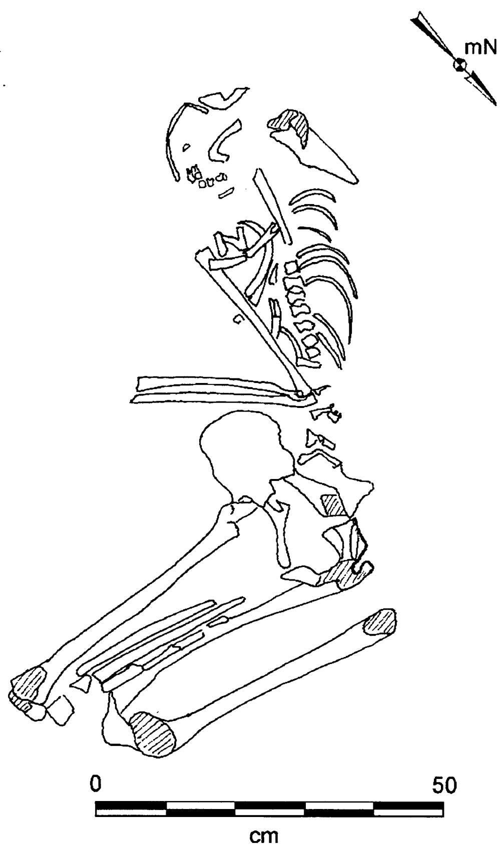

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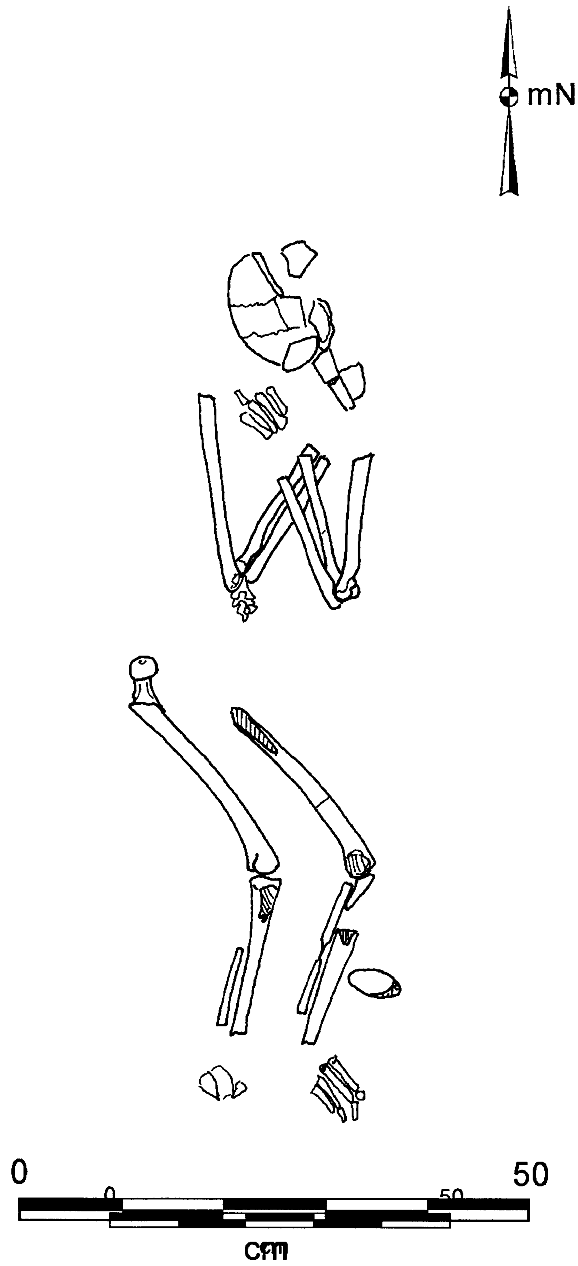

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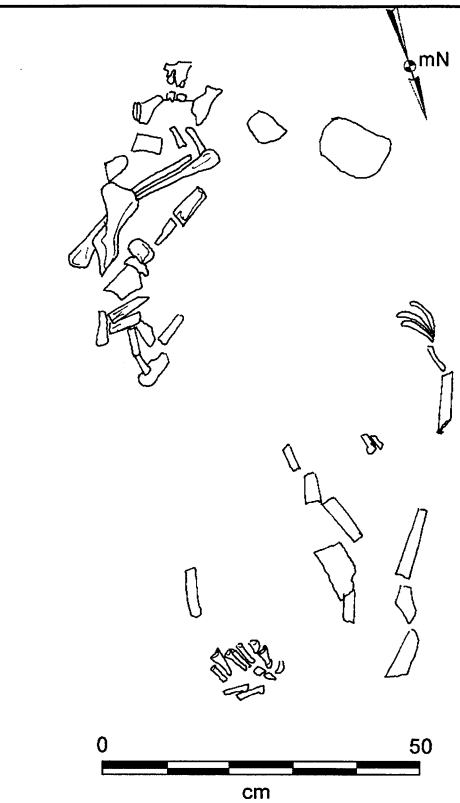

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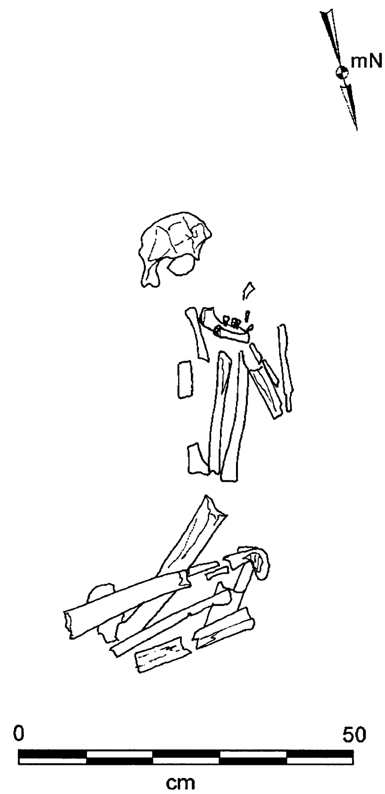

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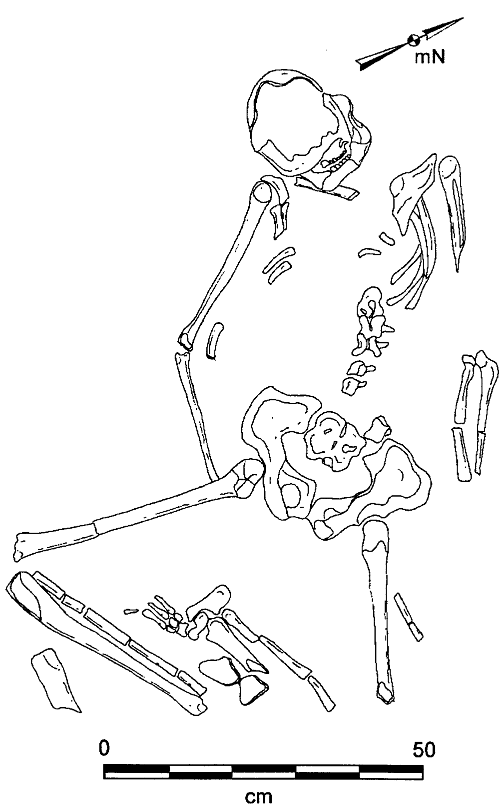

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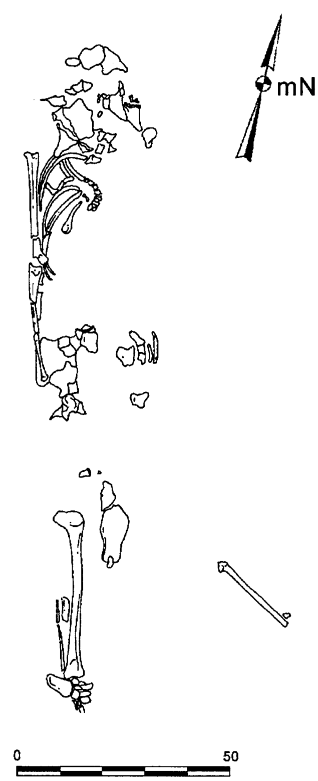

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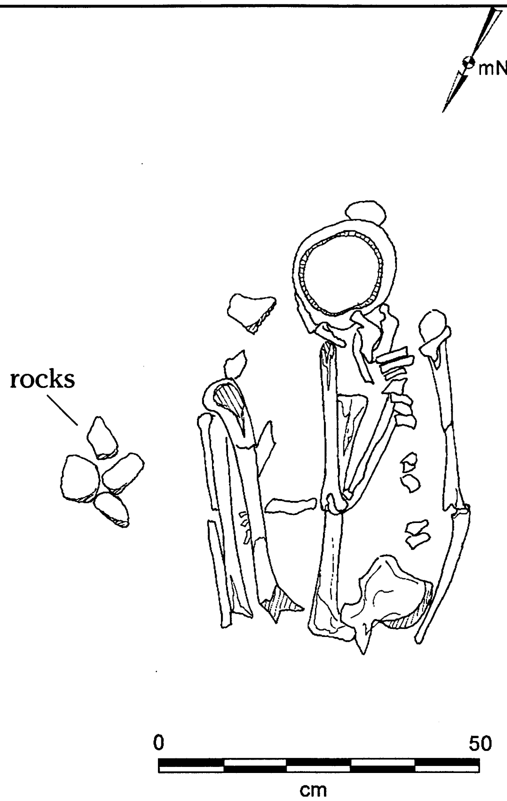

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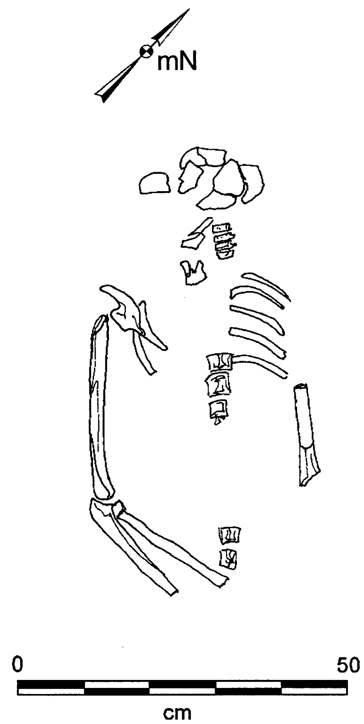

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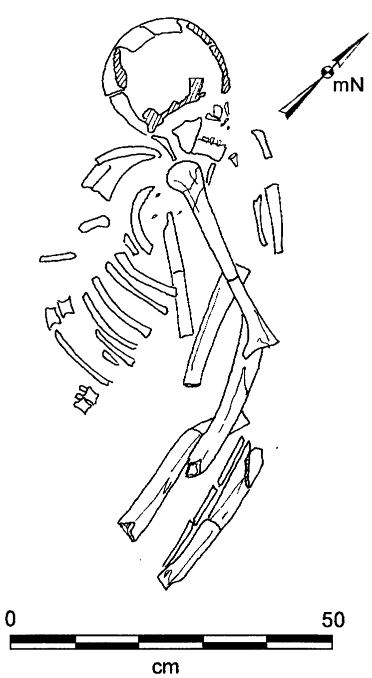

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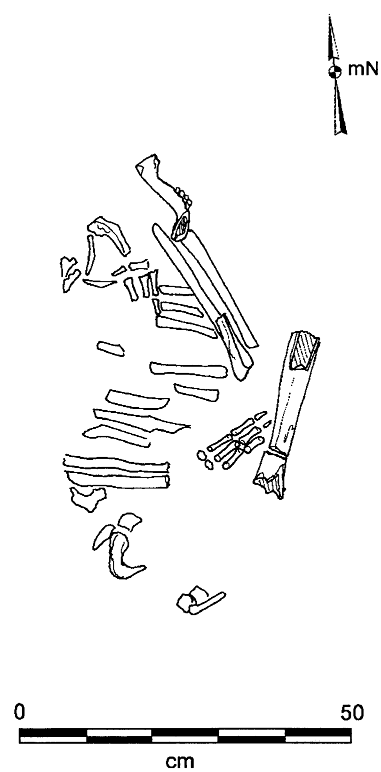

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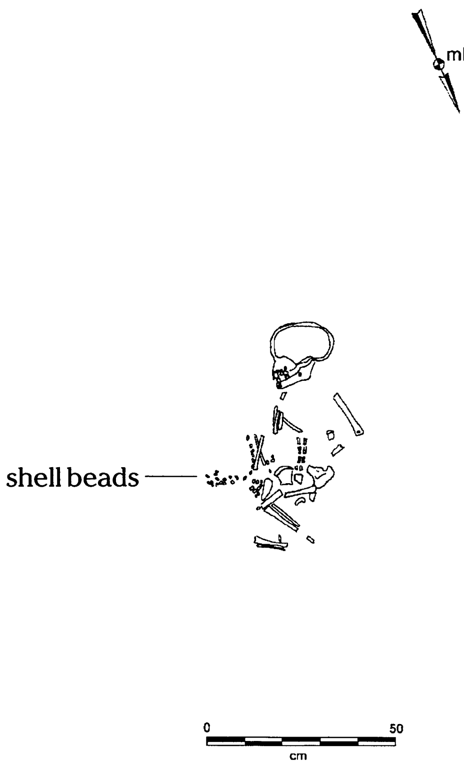

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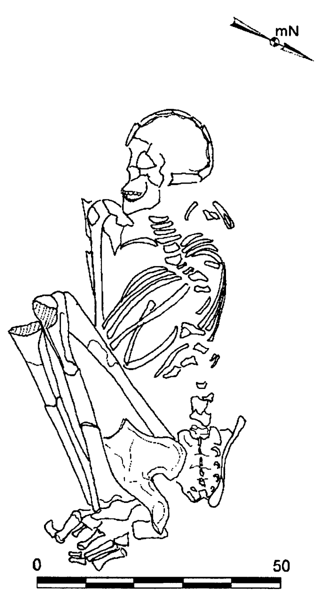

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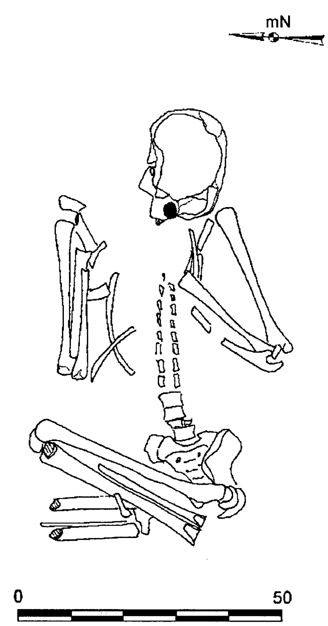

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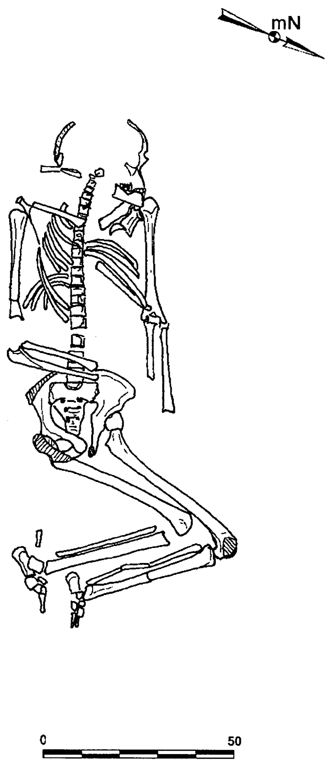

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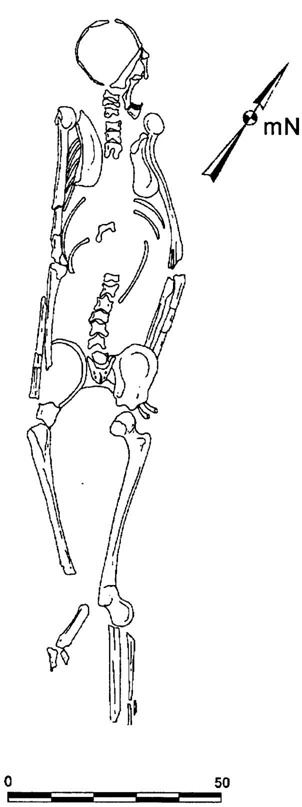

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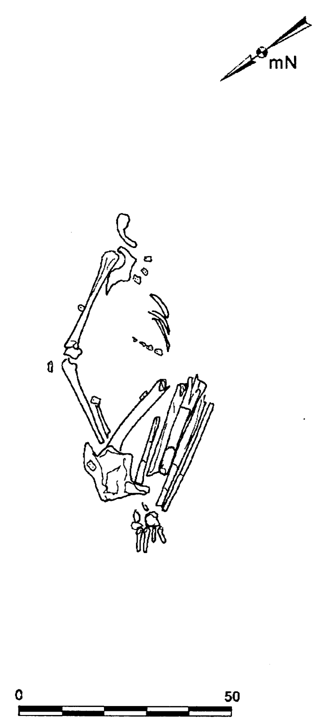

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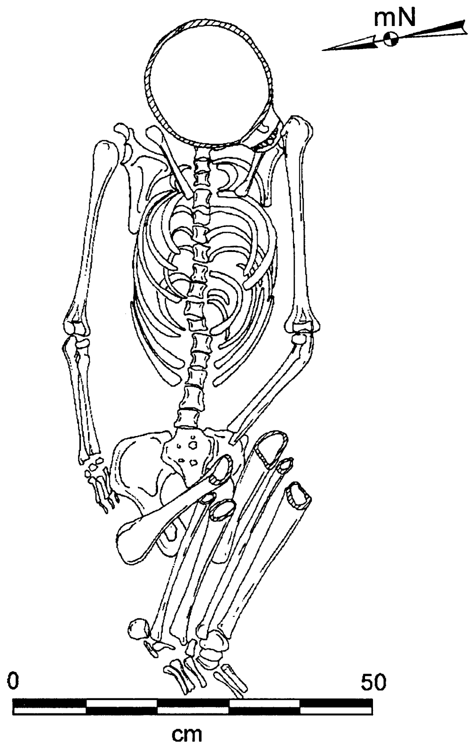

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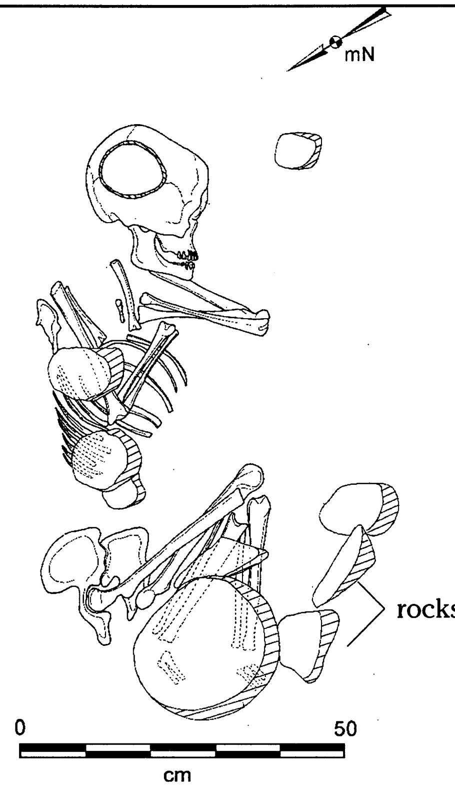

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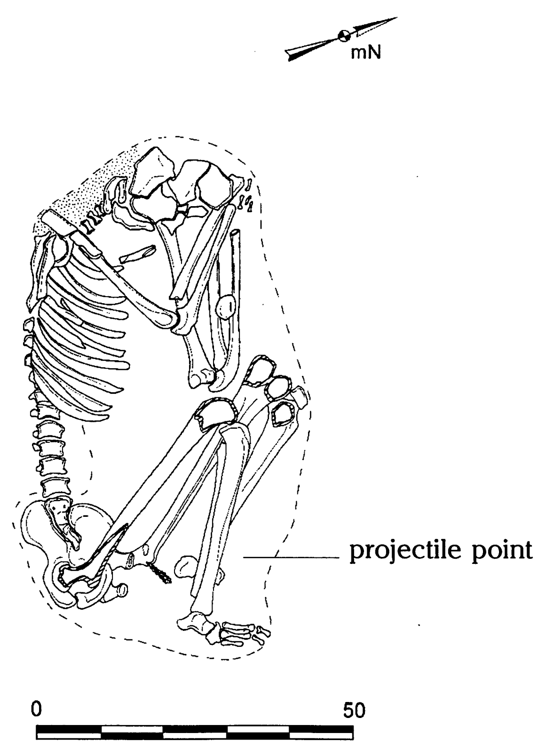

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APPENDIX E

PLANT IDENTIFICATIONS: CLAY IMPRESSIONS AND WOOD

UNIVERSITY OF CALIFORNIA AT BERKELEY

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COLLEGE OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL SCIENCE, POLICY, AND MANAGEMENT
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(510) 642-3765 FAX (510) 643-5438

December 16, 1996

Grace Ziesing
Staff Historical Archaeologist
Sonoma State University Academic Foundation, Inc.
Anthropological Studies center
1801 East Cotati Avenue, Bldg 29
Rhonert Park, CA 94928-3609

Dear Grace:

I have completed an evaluation of plant impressions in the clay samples from the Los Vaqueros Project.

Procedure:

1. Examine surface of sample for plant impressions.
2. Using hand lens and dissecting scope examine plant impressions, looking for indentifiable characteristics.
3. Potential diagnostic characteristics for gramineae are reproductive structures, caryopses, lennas, glumes, leaf width, ligules, venation patterns. Hair patterns, which are very important in grass vegetative ID, were not preserved in any of the samples.
3. Compare plant impressions with diagnostic structures to a list of potential species (see attachment), refer as needed to herbarium sheets from the UCB Range Herbarium.
4. Repeat steps 1-3 after breaking open sample.

Results:

I. Historical site CA-CCO-470H.

Five bricks and brick fragments were examined. All contained a similar array of plant impressions.

Each sample contains numerous impressions of grass stems and blades. Unfortunately none of the European grasses known to have been in the area by the 1850's have distinctive vegetative features. Leaf sizes and stem sizes are consistent with *Avena fatua* (wild oats), but could also be several introduced species of *Hordeum*, *Lolium*, or, unlikely, one of several native grass species. Several of the stems are unidentifiable herbaceous dicots.

Three glumes of *Avena fatua* (wild oats) were found in the samples, which means that at least some of the leaves and stems are from that species.

No grass caryopses were found in the material.

Two poorly preserved dicot seeds about 1mm diameter were found in the samples, but not identifiable to taxon. They are possibly seeds of the exotic *Medicago polymorpha* or another legume.

No woody plant material was found in the samples.

The presence of what is probably *Avena fatua* (wild oats) straw, with well-preserved leaves and glumes, but no caryopses, in the samples suggests that the bricks were manufactured in late spring or summer.

Site summary: No evidence of native herbaceous species, the material is overwhelmingly *Avena fatua (wild oats)*, which was known to be common in California by the mid 1840's. Material probably produced in late spring or early summer. Most accounts suggest that the conversion from perennial, native-dominated grassland to an annual, exotic-dominated grassland occurred before 1850 in coastal areas, therefore the composition of plant impressions in the samples is consistent with naturalized vegetation of the area.

II. Prehistoric site 696:

1. sample 95-8-593

Sample surface examined only

Sample contains an impression of the underside of a leaf of *Quercus douglasii* (blue oak). This identification is based on veination pattern, including included angle of second order veins, and leaf size.

The sample also contains an impression of a grass leaf, size and veination pattern consistent with but not diagnostic of *Nassella pulchra* (purple needlegrass).

2. The other samples from site 696 contain numerous grass blade impressions. Eight impressions are *Nasasella pulchra* (purple needlegrass) based on the leaf width (3.5mm), number of veins (12-15), and vein uniformity (no distinctly different mid-vein). The rest of the impressions, more than 20, are not conclusively identifiable, but are consistent with *Nassella pulchra*.

Site summary: Interesting is that there are no identifiable herbaceous dicot impressions in the material and no material that could be native annual grasses. It has been proposed that *Nassella pulchra* (purple needlegrass) was the dominant species in the original California grassland, but with little conclusive

evidence. Additionally, several people (including me) have suggested that native annuals were important elements in the vegetation. The contents of these samples, if reflective of local vegetation, support the theory that *Nassella pulchra* was the dominant herbaceous species, *Quercus douglasii* was in a canopy, and there were few dicots and no annual grasses present. However, the uniform presence of *Nassella pulchra* in the samples without other species could instead reflect deliberate gathering of this species, for example as thatch in a dwelling, caulking, or bedding. It is very unlikely that the local vegetation was so highly dominated by the one species.

III. Site 458

1. sample 1/30.5 2573 "baked clay with impression"

The impression is not from a plant.

2. sample 95-8-1791 (large) daub with beam or pole impressions.

Surface examined only and contains numerous grass leaf and stem impressions, all either dianostic of *Nassella pulchra* (purple needlegrass), or consistent with *Nassella pulchra*.

3. The other samples from site 458 include more impressions of *Nassella pulchra*. No conclusive evidence of any other herbaceous species on surface or within samples.

4. Two small "wood" fragments approximately 3x6x1 mm were found imbedded in fracture surface. These are tentatively identified as husks of *Juglands californica* (California black walnut).

Site summary: As in site 696, there are no identifiable herbaceous dicot impressions in the material from site 458 and no material that could be native annual grasses, with the same discussion as in the summary above. The husks of *Juglands californica* (California black walnut) should not be considered indicative of vegetation of the area because walnut was a common human food and may have been collected somewhere else.

Unfortunately most of the good vegetative identification characteristics for grasses are leaf hair patterns, which were not preserved in these samples. The ligule also can be a good character, but only one sample included the correct portion of the stem, and in that case, the ligule was not preserved. Grass reproductive structures (flowers and caryopses) were absent in the samples which made further identification of materials more difficult.

Species identified:

Nassella pulchra (purple needlegrass), native perennial grass
Avena fatua (wild oats) exotic annual grass
Quercus douglasii (blue oak) native tree
Juglands californica (California black walnut) native tree

Sincerely,

James W. Bartolome
Professor

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OFFICE OF THE VICE PRESIDENT—
AGRICULTURE AND NATURAL RESOURCES

Forest Products Laboratory
1301 South 46th Street
Richmond, CA 94804-4698
Phone: 510-215-4200
Fax: 510-215-4299

October 28, 1996

Mr. Jack Meyer
Project Coordinator
Anthropological Studies Center
Sonoma State University, Bldg. 29
Rohnert Park, CA 94928-3609

Dear Mr. Meyer:

Enclosed please find **Wood Identification Report No. 96-4**. If you have questions regarding the identification, please contact me at (510) 215-4217. An invoice in the amount of $150.00 is enclosed.

Sincerely,

Richard S. Dodd

Richard S. Dodd
Professor of Forestry

RSD:ah

Enclosure

c: Janice Montano

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Anthropological Studies Center
Sonoma State University, Bldg. 29
Rohnert Park, CA 94928-3609

WOOD SPECIMEN IDENTIFICATION
Report No.: 96-4
Date: October 28, 1996
Date Received: August 22, 1996

This report is for Specimen No. 1 of the 3 specimen(s) included in your request received on this date.

INFORMATION RECEIVED WITH SPECIMEN

Botanical or common name: ______

Geographic origin: ______

Nature of specimen: Natural Growth ___ Historical X Commercial ___ Litigation ___

Wood in service ___ Other ______

Physical description andcomments: Wood Sample 1 CA - CCO-696N

RESULTS

Botanical name: Aesculus californica

Commercial name: California buckeye

Comments: ______

Methods used in identification: Microscope X Hand Lens ___

DISPOSITION OF MATERIAL

	Retained (indefinitely)	Returned to you	Added to our collection	Discarded
Sample		X		
Microscope slides				X

296-91 *A Statewide Program of the Division of Agriculture and Natural Resources*

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Rohnert Park, CA 94928-3609

WOOD SPECIMEN IDENTIFICATION

Report No.: 96-4
Date: October 28, 1996
Date Received: August 22, 1996

This report is for Specimen No. 2 of the 3 specimen(s) included in your request received on this date.

INFORMATION RECEIVED WITH SPECIMEN

Botanical or common name:

Geographic origin:

Nature of specimen: Natural Growth ___ Historical X Commercial ___ Litigation ___

Wood in service ___ Other ___

Physical description andcomments: Wood Sample 2 CA - CCO-696N

RESULTS

Botanical name: Arbutus menziesii

Commercial name: Pacific madrone

Comments:

Methods used in identification: Microscope X Hand Lens ___

DISPOSITION OF MATERIAL

	Retained (indefinitely)	Returned to you	Added to our collection	Discarded
Sample		X		
Microscope slides				X

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WOOD SPECIMEN IDENTIFICATION

Report No.: 96-4
Date: October 28, 1996
Date Received: August 22, 1996

This report is for Specimen No. 3 of the 3 specimen(s) included in your request received on this date.

INFORMATION RECEIVED WITH SPECIMEN

Botanical or common name:

Geographic origin:

Nature of specimen: Natural Growth ___ Historical X Commercial ___ Litigation ___

Wood in service ___ Other ___

Physical description andcomments: Wood Sample 3 CA - CCO-696N

RESULTS

Botanical name: Acer macrophyllum

Commercial name: Bigleaf maple

Comments:

Methods used in identification: Microscope X Hand Lens ___

DISPOSITION OF MATERIAL

	Retained (indefinitely)	Returned to you	Added to our collection	Discarded
Sample		X		
Microscope slides				X

APPENDIX F

OBSIDIAN STUDIES

Obsidian Hydration Analysis Procedures and Results

by

Thomas M. Origer

Described below are the procedures used to prepare thin sections and make hydration band measurements.

Each specimen was examined to find two or more surfaces that would yield edges that would be perpendicular to the microslide when preparation of the thin section was completed. Saw cuts were made at an appropriate location along the edge of each specimen with a 4-inch diameter circular saw blade mounted on a lapidary trimsaw. The cuts resulted in the isolation of a small sample with a thickness of approximately one millimeter. Each sample was removed from its specimen and mounted with Lakeside Cement onto a permanently etched petrographic microslide.

The thickness of the samples was reduced by manual grinding with a slurry of #500 silicon carbide abrasive on a glass plate. The grinding was completed in two steps. The first grinding was stopped when the sample's thickness was reduced by approximately one-half, thus eliminating any micro-chips created by the saw blade. The slides were reheated, which liquefied the Lakeside Cement, and the samples inverted and then ground until the proper thickness was attained.

The correct thin section thickness was determined by the "touch" technique. A finger was rubbed across the slide, onto the sample, and the difference (sample thickness) was "felt." A coverslip was affixed over the thin sections when all grinding was completed. The microslides are curated at the SSU Hydration Lab under File Nos. 93-H1246, 94-H1386-1390, 95-H1430, 96-H1507 & 1508, 96-H1518 & 1519, 96-H1544, 96-H1553, and 96-H157 so that they are available to other researchers for future study.

The hydration bands were measured with a strainfree 60 power objective and a Bausch and Lomb 12.5 power filar micrometer eyepiece on a Nikon petrographic microscope. Six measurements were taken at separate locations along each thin section's edge. The mean of the measurements was calculated and it was listed, along with other pertinent information, on data tables. The hydration band measurements have a range of +/- 0.2 due to normal limitations of the equipment.

The abbreviations A, BH, BL, CD and NV listed under the "Source" column on the following pages stand for the Annadel, Bodie Hills, Borax Lake, Casa Diablo and Napa Valley sources, respectively. These source abbreviations are followed by a "v" in the parentheses that indicates that their source assignment was made based on visual analysis.

Obsidian Hydration

Lab#	Site#	Job#	Catalog#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
1	CA-CCO-458/H	94-H1386	SA 1	Serrated point base	NO/W180	Surface	none	1.8 1.8 1.8 1.8 1.9 1.9	1.8	NV (v)
2	CA-CCO-458/H	94-H1386	SA 2	Debitage	255/20.15	Surface	none	1.6 1.6 1.6 1.6 1.6 1.6	1.6	NV (v)
3	CA-CCO-458/H	94-H1386	SA 3	Debitage		Surface	none	2.4 2.4 2.5 2.5 2.5 2.5	2.5	NV (v)
4	CA-CCO-458/H	94-H1386	SA 4	Debitage		Surface	none	2.3 2.4 2.4 2.4 2.4 2.4	2.4	NV (v)
5	CA-CCO-458/H	94-H1386	SA 5	Serrated point frag		Surface	none	2.4 2.4 2.4 2.5 2.5 2.5	2.5	NV (v)
6	CA-CCO-458/H	94-H1386	SA 6	Debitage		Surface	none	1.8 1.8 1.8 1.9 2.0 2.1	1.9	NV (v)
7	CA-CCO-458/H	94-H1386	SA 7	Debitage		Surface	none	2.1 2.3 2.3 2.4 2.4 2.4	2.3	NV (v)
8	CA-CCO-458/H	94-H1386	SA 8	Debitage		Surface	none	2.4 2.4 2.4 2.4 2.4 2.4	2.4	NV (v)
9	CA-CCO-458/H	94-H1386	SA 9	Debitage		Surface	none	2.4 2.4 2.4 2.5 2.5 2.6	2.5	NV (v)
10	CA-CCO-458/H	94-H1386	SA 10	Point base		Surface	none	1.2 1.3 1.3 1.4 1.4 1.4	1.3	NV (v)
11	CA-CCO-458/H	94-H1386	SA 11	Debitage		Surface	none	1.6 1.7 1.7 1.8 1.8 1.8	1.7	NV (v)
12	CA-CCO-458/H	94-H1386	SA 12	Debitage		Surface	none	2.1 2.1 2.1 2.1 2.1 2.3	2.1	NV (v)
13	CA-CCO-458/H	94-H1386	SA 13	Debitage		Surface	none	2.5 2.5 2.5 2.5 2.6 2.6	2.5	NV (v)
14	CA-CCO-458/H	94-H1386	SA 14	Biface fragment		Surface	weathered	3.2 3.3 3.3 3.3 3.5 3.5	3.4	NV (v)
15	CA-CCO-458/H	94-H1386	SA 15	Point base		Surface	none	3.0 3.1 3.1 3.1 3.2 3.2	3.1	NV (v)
16	CA-CCO-458/H	94-H1386	SA 16	Debitage		Surface	none	1.2 1.2 1.2 1.2 1.2 1.2	1.2	NV (v)
17	CA-CCO-458/H	94-H1386	SA 17	Chunk?		Surface	none	1.2 1.2 1.2 1.2 1.2 1.3	1.2	NV (v)
18	CA-CCO-458/H	94-H1386	SA 20	Debitage		Surface	none	1.3 1.3 1.4 1.4 1.4 1.4	1.4	NV (v)
19	CA-CCO-458/H	94-H1386	SA 20	Debitage		Surface	none	1.7 1.7 1.7 1.8 1.8 1.8	1.8	NV (v)
20	CA-CCO-458/H	94-H1386	SA 22	Serrated point tip		Surface	none	3.6 3.6 3.7 3.8 3.8 3.8	3.7	?
21	CA-CCO-458/H	94-H1386	SA 23	Debitage		Surface	none	1.8 1.8 1.8 1.8 1.9 1.9	1.8	NV (v)
22	CA-CCO-458/H	94-H1386	SA 24	Debitage		Surface	none		DH	NV (v)
23	CA-CCO-458/H	94-H1386	SA 25	Debitage		Surface	none	2.1 2.1 2.1 2.1 2.3 2.3	2.2	NV (v)
24	CA-CCO-458/H	94-H1386	SA 26	Debitage		Surface	none	3.9 4.1 4.1 4.1 4.2 4.2	4.1	NV (v)
25	CA-CCO-458/H	94-H1386	SA 27	Debitage		Surface	none	2.3 2.4 2.4 2.4 2.4 2.5	2.4	NV (v)
26	CA-CCO-458/H	94-H1386	SA 28	Debitage		Surface	none	1.8 1.8 1.8 1.8 1.9 1.9	1.8	NV (v)
27	CA-CCO-458/H	94-H1386	SA 29	Debitage		Surface	none	2.0 2.0 2.0 2.0 2.0 2.1	2.0	NV (v)
28	CA-CCO-458/H	94-H1386	SA 30	Debitage		Surface	none	3.2 3.2 3.2 3.2 3.2 3.2	3.2	NV (v)
29	CA-CCO-458/H	94-H1386	SA 31	Debitage		Surface	none	1.6 1.7 1.7 1.7 1.7 1.7	1.7	NV (v)
30	CA-CCO-458/H	94-H1386	SA 32	Debitage		Surface	none	1.7 1.7 1.7 1.7 1.7 1.8	1.7	NV (v)
31	CA-CCO-458/H	94-H1386	SA 33	Debitage		Surface	none	2.3 2.3 2.3 2.3 2.4 2.4	2.3	NV (v)
32	CA-CCO-458/H	94-H1386	SA 33B	Debitage		Surface	none	1.9 1.9 1.9 1.9 1.9 1.9	1.9	NV (v)
33	CA-CCO-458/H	94-H1386	SA 34	Debitage		Surface	none	2.3 2.3 2.4 2.4 2.4 2.5	2.4	NV (v)
34	CA-CCO-458/H	94-H1386	SA 34B	Debitage		Surface	none	3.2 3.2 3.2 3.3 3.3 3.3	3.3	NV (v)
35	CA-CCO-458/H	94-H1386	SA 35	Debitage		Surface	none	1.9 2.0 2.0 2.1 2.1 2.1	2.0	NV (v)
36	CA-CCO-458/H	94-H1386	SA 36	Debitage		Surface	none		NVB	NV (v)
37	CA-CCO-458/H	94-H1386	SA 37	Debitage		Surface	none	1.8 1.8 1.8 1.8 1.8 2.0	1.8	NV (v)
38	CA-CCO-458/H	94-H1386	SA 38	Debitage		Surface	none	1.7 1.7 1.7 1.8 1.8 1.8	1.8	NV (v)

Lab#	Site#	Job#	Catalog#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
39	CA-CCO-458/H	94-H1386	SA 39	Debitage		Surface	none	1.4 1.4 1.4 1.6 1.6 1.6	1.5	NV (v)
40	CA-CCO-458/H	94-H1386	SA 40	Debitage		Surface	none	2.1 2.3 2.3 2.3 2.3 2.3	2.3	NV (v)
41	CA-CCO-458/H	94-H1386	SA 41A	Debitage		Surface	none	1.8 1.8 1.9 1.9 1.9 1.9	1.9	NV (v)
42	CA-CCO-458/H	94-H1386	SA 41B	Point base		Surface	none	1.0 1.0 1.1 1.1 1.1 1.1	1.1	NV (v)
43	CA-CCO-458/H	94-H1386	SA 41C	Debitage		Surface	none	1.1 1.1 1.1 1.1 1.2 1.2	1.1	NV (v)
44	CA-CCO-458/H	94-H1386	SA 41D	Debitage		Surface	none	3.2 3.2 3.2 3.2 3.2 3.2	3.2	NV (v)
45	CA-CCO-458/H	94-H1386	SA 41E	Biface fragment		Surface	none	1.9 2.0 2.0 2.0 2.0 2.1	2.0	NV (v)
1	CA-CC0-459	94-H1387	O	Debitage	S1/W0	0-10	none	1.9 2.0 2.0 2.1 2.1 2.1	2.0	NV (v)
2	CA-CC0-459	94-H1387	P	Debitage	S2/W0	40-50	none	2.4 2.4 2.4 2.4 2.4 2.4	2.4	NV (v)
3	CA-CC0-459	94-H1387	Q	Debitage	N0/E5	0-10	weathered		DH	?
4	CA-CC0-459	94-H1387	R	Debitage	N0/E5	0-10	none	1.8 1.8 1.8 1.8 1.9 1.9	1.8	NV (v)
5	CA-CC0-459	94-H1387	S	Debitage	Trench	St. A	none	2.6 2.6 2.7 2.7 2.7 2.9	2.7	NV (v)
6	CA-CC0-459	94-H1387	T	Debitage	S2/E5	0-10	none	1.6 1.6 1.7 1.7 1.7 1.7	1.7	NV (v)
7	CA-CC0-459	94-H1387	U	Debitage	S2/E5	0-10	none	1.2 1.2 1.3 1.3 1.3 1.3	1.3	NV (v)
8	CA-CC0-459	94-H1387	V	Biface fragment	S2/E5	0-10	none	5.0 5.0 5.1 5.3 5.3 5.3	5.2	NV (v)
9	CA-CC0-459	94-H1387	W	Biface fragment	S2/E5	0-10	none	2.0 2.0 2.0 2.1 2.1 2.1	2.1	NV (v)
10	CA-CC0-459	94-H1387	X	Debitage	N1.5/E5	20-30	none	2.1 2.1 2.1 2.1 2.1 2.1	2.1	?
11	CA-CC0-459	94-H1387	Y	Debitage	Trench	St. A	weathered	3.3 3.3 3.5 3.5 3.5 3.5	3.4	NV (v)
1	CA-CC0-462/468	94-H1388	K	Serrated point	N0/W2	20-30	none	1.2 1.2 1.2 1.2 1.3 1.4	1.3	NV (v)
2	CA-CC0-462/468	94-H1388	L	Serrated point	S10/W40	0-20	none	1.0 1.1 1.1 1.1 1.2 1.2	1.1	NV (v)
3	CA-CC0-462/468	94-H1388	M	Serrated point	S10/W100	0-20	none	2.3 2.3 2.3 2.3 2.4 2.4	2.3	NV (v)
4	CA-CC0-462/468	94-H1388	N	Serrated point	N0/W30	0-20	none	1.2 1.2 1.2 1.2 1.2 1.2	1.2	NV (v)
1	CA-CC0-636	94-H1389	A	Debitage	N50/W0	0-20	none	1.2 1.2 1.2 1.2 1.3 1.3	1.2	NV (v)
2	CA-CC0-636	94-H1389	ZZ	Debitage	S10/W0	0-20	none	2.5 2.6 2.6 2.6 2.6 2.6	2.6	NV (v)
3	CA-CC0-636	94-H1389	BB	Point		Surface	none	1.8 1.9 1.9 1.9 1.9 1.9	1.9	?
4	CA-CC0-636	94-H1389	CC	Biface fragment		Surface	none	2.7 2.9 2.9 2.9 3.0 3.0	2.9	NV (v)
5	CA-CC0-636	94-H1389	DD	Debitage		Surface	none	2.6 2.6 2.6 2.6 2.7 2.7	2.6	NV (v)
6	CA-CC0-636	94-H1389	EE	Debitage	Trench 7	40-50	none	2.5 2.5 2.6 2.6 2.6 2.6	2.6	?
7	CA-CC0-636	94-H1389	FF	Debitage	Feature 1	Exp. Mat.	none	2.4 2.4 2.4 2.4 2.4 2.6	2.4	NV (v)
8	CA-CC0-636	94-H1389	GG	Debitage	Feature 1	Exp. Mat.	none	2.0 2.1 2.1 2.1 2.1 2.1	2.1	NV (v)
9	CA-CC0-636	94-H1389	HH	Debitage	Feature 1	Exp. BD	none	1.9 1.9 1.9 2.0 2.1 2.1	2.0	NV (v)
1	CA-CCO-637	94-H1390	A	Debitage		Surface	Band 1	1.2 1.2 1.3 1.3 1.3 1.3	1.3	NV (v)
1	CA-CCO-637	94-H1390	A	Debitage		Surface	Band 2	2.3 2.3 2.4 2.4 2.4 2.4	2.4	?
2	CA-CCO-637	94-H1390	B	Debitage		Surface	none	3.5 3.6 3.6 3.6 3.6 3.7	3.6	NV (v)
3	CA-CCO-637	94-H1390	C	Debitage	S20;W0	60-80	weathered	2.0 2.0 2.1 2.1 2.1 2.1	2.1	NV (v)
4	CA-CCO-637	94-H1390	D	Debitage	S20;W0	60-80	weathered	3.6 3.6 3.6 3.6 3.7 3.7	3.6	NV (v)
5	CA-CCO-637	94-H1390	E	Debitage	S10;W0	40-50	weathered	3.6 3.6 3.6 3.6 3.6 3.7	3.6	NV (v)
6	CA-CCO-637	94-H1390	F	Debitage	S10;W0	30-40	none	3.7 3.7 3.7 3.7 3.8 3.8	3.7	NV (v)

Obsidian Hydration

Lab#	Site#	Job#	Catalog#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
7	CA-CCO-637	94-H1390	G	Debitage	S10;W0	0-10	weathered	3.7 3.7 3.7 3.7 3.7 3.9	3.7	NV (v)
8	CA-CCO-637	94-H1390	H	Debitage		Surface	none	3.6 3.6 3.6 3.6 3.6 3.6	3.6	NV (v)
9	CA-CCO-637	94-H1390	J	Debitage		Surface	none	3.1 3.2 3.2 3.2 3.2 3.2	3.2	NV (v)
10	CA-CCO-637	94-H1390	HH	Debitage	4-8M	60-80	none	3.1 3.2 3.2 3.2 3.3 3.3	3.2	NV? (v)
11	CA-CCO-637	94-H1390	II	Debitage	4-8M	60-80	none	1.5 1.6 1.6 1.6 1.6 1.7	1.6	NV (v)
12	CA-CCO-637	94-H1390	JJ	Debitage	4-8M	60-80	none	4.5 4.5 4.5 4.6 4.7 4.7	4.6	NV (v)
13	CA-CCO-637	94-H1390	CC	Debitage	8-12M	60-80	none	2.6 2.7 2.7 2.7 2.8 2.8	2.7	NV (v)
14	CA-CCO-637	94-H1390	DD	Debitage	12-16M	60-80	weathered		DH	NV (v)
15	CA-CCO-637	94-H1390	EE	Debitage	12-16M	60-80	weathered	3.9 4.0 4.0 4.0 4.0 4.1	4.0	NV (v)
16	CA-CCO-637	94-H1390	FF	Debitage	12-16M	60-80	weathered	3.3 3.3 3.4 3.4 3.5 3.5	3.4	NV (v)
17	CA-CCO-637	94-H1390	V	Debitage	16-20M	60-80	none	1.2 1.4 1.4 1.4 1.5 1.5	1.4	A (v)
18	CA-CCO-637	94-H1390	W	Debitage	16-20M	60-80	none	1.9 2.0 2.0 2.0 2.0 2.0	2.0	NV (v)
19	CA-CCO-637	94-H1390	X	Debitage	16-20M	60-80	none	3.0 3.0 3.1 3.1 3.1 3.2	3.1	NV (v)
20	CA-CCO-637	94-H1390	Y	Debitage	20-24M	60-80	none	2.6 2.6 2.7 2.7 2.7 2.8	2.7	NV (v)
21	CA-CCO-637	94-H1390	Z	Debitage	20-24M	60-80	weathered		DH	NV (v)
22	CA-CCO-637	94-H1390	AA	Debitage	20-24M	60-80	none	2.3 2.3 2.3 2.4 2.4 2.5	2.4	NV (v)
23	CA-CCO-637	94-H1390	BB	Debitage	20-24M	60-80	none	2.8 2.8 2.9 3.0 3.0 3.0	2.9	NV (v)
24	CA-CCO-637	94-H1390	GG	Biface tip	28-32M	60-80	none	2.7 2.7 2.7 2.7 2.8 2.8	2.7	NV (v)
1	CA-CC0-696	95-H1430	A	Biface end	Trench5-2-12	40-60	none	2.4 2.5 2.5 2.5 2.6 2.6	2.5	NV (v)
2	CA-CC0-696	95-H1430	B	Biface end	Backhoe	Spoils	none	4.2 4.2 4.3 4.3 4.3 4.4	4.3	BH? (v)
3	CA-CC0-696	95-H1430	C	Biface	Burial 2	Matrix	none	2.3 2.3 2.4 2.4 2.5 2.5	2.4	A? (v)
4	CA-CC0-696	95-H1430	D	Debitage	N0;W2	70-80	none	2.4 2.5 2.5 2.5 2.5 2.5	2.5	NV (v)
5	CA-CC0-696	95-H1430	E	Debitage	N0;W2	70-80	weathered	0.8 0.8 0.8 0.8 0.9 0.9	0.8	NV (v)
6	CA-CC0-696	95-H1430	F	Debitage	N0;W2	80-90	none	2.4 2.4 2.5 2.5 2.6 2.6	2.5	NV (v)
7	CA-CC0-696	95-H1430	G	Debitage	N0;W2	80-90	Band 1	2.7 2.7 2.7 2.8 2.8 2.9	2.8	NV (v)
7	CA-CC0-696	95-H1430	G	Debitage	N0;W2	80-90	Band 2	4.8 4.8 4.9 4.9 5.0 5.0	4.9	NV (v)
8	CA-CC0-696	95-H1430	H	Debitage	N0;W2	80-90	none	3.0 3.0 3.0 3.0 3.1 3.1	3.0	NV (v)
9	CA-CC0-696	95-H1430	I	Debitage	N0;W2	80-90	none	3.1 3.1 3.1 3.1 3.2 3.2	3.1	NV (v)
10	CA-CC0-696	95-H1430	J	Biface fragment	Backhoe	Spoils	none	2.7 2.7 2.7 2.7 2.8 2.9	2.8	NV (v)
11	CA-CC0-696	95-H1430	K	Debitage	N0;W2	90-100	none	2.4 2.4 2.4 2.5 2.5 2.5	2.5	NV (v)
12	CA-CC0-696	95-H1430	L	Debitage	N0;W2	90-100	none	2.4 2.4 2.5 2.5 2.5 2.5	2.5	NV (v)
13	CA-CC0-696	95-H1430	M	Debitage	N0;W2	90-100	none	2.5 2.5 2.5 2.6 2.6 2.7	2.6	NV (v)
14	CA-CC0-696	95-H1430	N	Debitage	N0;W5	80-90	weathered		VW	NV (v)
15	CA-CC0-696	95-H1430	O	Biface fragment	N0;W5	80-90	none	2.4 2.5 2.5 2.5 2.6 2.6	2.5	NV (v)
16	CA-CC0-696	95-H1430	P	Debitage	S3;W2	60-70	none	2.4 2.4 2.4 2.5 2.6 2.6	2.5	NV (v)
17	CA-CC0-696	95-H1430	Q	Debitage	S3;W2	60-70	none	3.8 3.8 3.9 3.9 3.9 3.9	3.9	NV (v)
18	CA-CC0-696	95-H1430	R	Biface fragment	S3;W5	51-60	weathered	3.0 3.0 3.0 3.1 3.1 3.1	3.1	NV (v)
19	CA-CC0-696	95-H1430	S	Biface fragment	N0;W5	70-80	none	2.5 2.6 2.6 2.6 2.7 2.7	2.6	NV (v)

Obsidian Hydration

Lab#	Site#	Job#	Catalog#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
20	CA-CC0-696	95-H1430	T	Biface fragment	N0;W5	70-80	none	2.4 2.4 2.4 2.5 2.5 2.6	2.5	NV (v)
21	CA-CC0-696	95-H1430	U	Biface end	Burial 4	Matrix	none	2.9 2.9 2.9 3.0 3.0 3.1	3.0	NV (v)
22	CA-CC0-696	95-H1430	T-01	Biface	Tr 7-27-1	327 cm	none	3.2 3.2 3.3 3.3 3.3 3.3	3.3	BL? (v)
23	CA-CC0-696	95-H1430	T-02	Debitage	Tr 7-27-1	327 cm	none	2.3 2.3 2.3 2.4 2.4 2.4	2.4	NV (v)
24	CA-CC0-696	95-H1430	T-05	Biface	NW 1 deep ex	340-390BD	none	6.7 6.9 6.9 6.9 7.0 7.0	6.9	
25	CA-CC0-696	95-H1430	T-04	Debitage	NW 1 deep ex	340-410BD	none	1.7 1.7 1.7 1.8 1.8 2.0	1.8	
26	CA-CC0-696	95-H1430	T-03	Debitage	SW 1 deep ex	340-410BS	none	1.2 1.2 1.3 1.3 1.3 1.4	1.3	
1	CA-CCO-637	96-H1507	95-7-109	Debitage	S27;W3	100-110	none	2.7 2.7 2.8 2.8 2.8 2.9	2.8	NV (v)
2	CA-CCO-637	96-H1507	95-7-115	Debitage	S27;W3	110-120	none	2.9 2.9 2.9 3.0 3.0 3.0	3.0	NV (v)
3	CA-CCO-637	96-H1507	95-7-148B	Debitage	S29;W3	70-80	weathered	4.1 4.1 4.2 4.2 4.2 4.4	4.2	NV (v)
4	CA-CCO-637	96-H1507	95-7-161	Debitage	S29;W3	90-100	none	2.9 2.9 3.0 3.0 3.0 3.2	3.0	NV (v)
5	CA-CCO-637	96-H1507	95-7-186	Biface fragment	S31;W3	70-80	none	2.8 2.8 2.8 2.8 2.8 2.9	2.8	NV (v)
6	CA-CCO-637	96-H1507	95-7-193	Debitage	S31;W3	80-90	none	1.4 1.4 1.5 1.5 1.6 1.6	1.5	NV (v)
7	CA-CCO-637	96-H1507	95-7-202	Debitage	S31;W3	90-100	none	1.5 1.6 1.6 1.6 1.6 1.7	1.6	NV (v)
8	CA-CCO-637	96-H1507	95-7-220B	Debitage	S31;W3	120-130	none	2.3 2.3 2.4 2.4 2.5 2.5	2.4	NV (v)
9	CA-CCO-637	96-H1507	95-7-220F	Debitage	S31;W3	120-130	none	2.2 2.2 2.2 2.2 2.3 2.3	2.2	NV (v)
10	CA-CCO-637	96-H1507	95-7-253A	Debitage	S33;W3	90-100	weathered	4.6 4.7 4.7 4.7 4.7 4.7	4.7	NV (v)
11	CA-CCO-637	96-H1507	95-7-274A	Debitage	S33;W3	120-130	none	4.3 4.3 4.3 4.3 4.4 4.5	4.4	NV (v)
12	CA-CCO-637	96-H1507	95-7-274B	Debitage	S33;W3	120-130	none	2.9 2.9 2.9 3.0 3.0 3.1	3.0	NV (v)
1	CA-CC0-696	96-H1508	79A	Debitage	BUR. 54	bur. mtx.	none	3.2 3.3 3.3 3.3 3.3 3.4	3.3	BL? (v)
2	CA-CC0-696	96-H1508	79B	Debitage	BUR. 54	bur. mtx.	none	3.3 3.3 3.3 3.3 3.3 3.4	3.3	BL? (v)
3	CA-CC0-696	96-H1508	79C	Debitage	BUR. 54	bur. mtx.	none	4.1 4.3 4.3 4.3 4.4 4.4	4.3	BL? (v)
4	CA-CC0-696	96-H1508	79D	Debitage	BUR. 54	bur. mtx.	none	2.0 2.0 2.0 2.0 2.0 2.0	2.0	NV (v)
5	CA-CC0-696	96-H1508	124	Debitage	BUR. 83	bur. mtx.	none	4.0 4.1 4.1 4.1 4.1 4.3	4.1	NV (v)
6	CA-CC0-696	96-H1508	204A	Debitage	BUR. 12	exp. mtx.	none	2.0 2.1 2.2 2.2 2.2 2.2	2.2	NV (v)
7	CA-CC0-696	96-H1508	204B	Debitage	BUR. 12	exp. mtx.	none	2.0 2.0 2.0 2.0 2.1 2.1	2.0	NV (v)
8	CA-CC0-696	96-H1508	205	Debitage	BUR. 12	90-100	none	3.7 3.8 3.8 3.8 3.9 3.9	3.8	NV (v)
9	CA-CC0-696	96-H1508	249A	Debitage	BUR.16,23,24	bur. mtx.	none	2.4 2.5 2.5 2.5 2.5 2.6	2.5	NV (v)
10	CA-CC0-696	96-H1508	249B	Debitage	BUR.16,23,24	bur. mtx.	none	4.7 4.7 4.7 4.7 4.7 4.8	4.7	NV (v)
11	CA-CC0-696	96-H1508	249C	Debitage	BUR.16,23,24	bur. mtx.	none	2.5 2.5 2.5 2.5 2.5 2.6	2.5	NV (v)
12	CA-CC0-696	96-H1508	249D	Debitage	BUR.16,23,24	bur. mtx.	weathered	3.8 3.8 3.9 3.9 3.9 4.0	3.9	NV (v)
13	CA-CC0-696	96-H1508	249H	Debitage	BUR.16,23,24	bur. mtx.	none	4.8 4.9 4.9 5.0 5.0 5.0	4.9	NV (v)
14	CA-CC0-696	96-H1508	300A	Debitage	BUR. 30	exp. mtx.	none	4.0 4.0 4.0 4.0 4.1 4.1	4.0	NV (v)
15	CA-CC0-696	96-H1508	322	Debitage	BUR. 40	exp. mtx.	none	2.0 2.0 2.0 2.1 2.1 2.1	2.1	NV (v)
16	CA-CC0-696	96-H1508	323A	Debitage	BUR. 42		none	3.0 3.0 3.0 3.0 3.1 3.1	3.0	NV (v)
17	CA-CC0-696	96-H1508	323B	Debitage	BUR. 42		none	3.0 3.0 3.0 3.1 3.2 3.2	3.1	NV (v)
18	CA-CC0-696	96-H1508	323C	Debitage	BUR. 42		none	2.5 2.6 2.6 2.6 2.6 2.6	2.6	NV (v)
19	CA-CC0-696	96-H1508	326	Debitage	BUR. 47	bur. mtx.	weathered	2.2 2.4 2.4 2.4 2.4 2.5	2.4	NV (v)

Lab#	Site#	Job#	Catalog#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
20	CA-CC0-696	96-H1508	340A	Debitage	BUR. 59	bur. mtx.	none	2.5 2.5 2.5 2.5 2.5 2.5	2.5	NV (v)
21	CA-CC0-696	96-H1508	363B	Biface fragment	BUR. 73	exp. mtx.	weathered	3.0 3.0 3.0 3.0 3.0 3.2	3.0	NV (v)
22	CA-CC0-696	96-H1508	363C	Debitage	BUR. 73	exp. mtx.	none	2.5 2.6 2.6 2.7 2.7 2.9	2.7	NV (v)
23	CA-CC0-696	96-H1508	366	Debitage	BUR. 75	bur. mtx.	none	4.1 4.1 4.2 4.2 4.2 4.3	4.2	NV (v)
24	CA-CC0-696	96-H1508	367	Debitage	BUR. 75	bur. mtx.	none	2.8 2.8 2.8 2.9 2.9 3.0	2.9	NV (v)
25	CA-CC0-696	96-H1508	385A	Debitage	BUR. 107	bur. mtx.	none	3.4 3.4 3.5 3.5 3.6 3.6	3.5	NV (v)
26	CA-CC0-696	96-H1508	385B	Debitage	BUR. 107	bur. mtx.	none	1.6 1.7 1.7 1.7 1.8 1.9	1.7	NV (v)
27	CA-CC0-696	96-H1508	416A	Debitage	BUR. 130	bur. mtx.	none	2.3 2.3 2.4 2.4 2.4 2.5	2.4	NV (v)
28	CA-CC0-696	96-H1508	416B	Debitage	BUR. 130	bur. mtx.	none	2.7 2.8 2.8 2.8 2.8 2.8	2.8	NV (v)
29	CA-CC0-696	96-H1508	430A	Debitage	BUR. 139	exp. mtx.	none	2.7 2.8 2.8 2.8 2.8 2.8	2.8	NV (v)
30	CA-CC0-696	96-H1508	430C	Debitage	BUR. 139	exp. mtx.	none	3.1 3.3 3.3 3.3 3.3 3.3	3.3	NV (v)
31	CA-CC0-696	96-H1508	432	Biface fragment	BUR. 139	bur. mat.	weathered	10.3 10.4 10.4 10.4 10.5 10.6	10.4	NV (v)
32	CA-CC0-696	96-H1508	443	Debitage	BUR. 145	bur. mat.	weathered		DH	NV (v)
33	CA-CC0-696	96-H1508	448	Debitage	BUR. 148	bur. mat.	none	2.2 2.2 2.2 2.3 2.3 2.4	2.3	NV (v)
34	CA-CC0-696	96-H1508	523B	Debitage	BUR. 7	bur. mat.	none	3.1 3.2 3.2 3.3 3.3 3.4	3.3	NV (v)
35	CA-CC0-696	96-H1508	523C	Debitage	BUR. 7	bur. mat.	none	3.3 3.3 3.4 3.4 3.4 3.4	3.4	NV (v)
36	CA-CC0-696	96-H1508	595A	Debitage	Feat. 12	Exp. 1	none	3.3 3.3 3.3 3.3 3.3 3.3	3.3	NV (v)
37	CA-CC0-696	96-H1508	595B	Debitage	Feat. 12	Exp. 1	none	4.7 4.9 4.9 4.9 5.0 5.0	4.9	NV (v)
38	CA-CC0-696	96-H1508	602A	Debitage	Feat. 20		none	2.5 2.5 2.6 2.6 2.6 2.7	2.6	NV (v)
39	CA-CC0-696	96-H1508	602B	Debitage	Feat. 20		none	3.3 3.4 3.4 3.4 3.4 3.5	3.4	NV (v)
40	CA-CC0-696	96-H1508	603A	Debitage	Feat. 20		none	2.5 2.6 2.6 2.6 2.6 2.7	2.6	NV (v)
41	CA-CC0-696	96-H1508	603B	Debitage	Feat. 20		none	2.3 2.4 2.4 2.5 2.5 2.5	2.4	NV (v)
1	CA-CCO-637	96-H1518	95-7-81	Biface fragment	S27;W3	70-80	none	2.6 2.7 2.7 2.8 2.8 2.9	2.8	NV
2	CA-CCO-637	96-H1518	95-7-80	EMP	S27;W3	70-80	none	2.1 2.1 2.1 2.1 2.2 2.2	2.1	NV
3	CA-CCO-637	96-H1518	95-7-82	Debitage	S27;W3	70-80	none	2.1 2.1 2.2 2.2 2.2 2.3	2.2	NV
4	CA-CCO-637	96-H1518	95-7-99A	Debitage	S27;W3	90-100	none	2.1 2.2 2.2 2.2 2.3 2.3	2.2	NV
5	CA-CCO-637	96-H1518	95-7-99B	Debitage	S27;W3	90-100	none	2.5 2.5 2.6 2.6 2.6 2.6	2.6	CD
6	CA-CCO-637	96-H1518	95-7-121A	Debitage	S27;W3	120-130	none	2.5 2.6 2.6 2.6 2.6 2.7	2.6	NV
7	CA-CCO-637	96-H1518	95-7-121B	Debitage	S27;W3	120-130	weathered	1.0 1.1 1.1 1.1 1.1 1.2	1.1	A
8	CA-CCO-637	96-H1518	95-7-139	Debitage	S27;W3	140-150	Band 1	2.6 2.6 2.7 2.7 2.8 2.9	2.7	NV
8	CA-CCO-637	96-H1518	95-7-139	Debitage	S27;W3	140-150	Band 2	4.6 4.7 4.7 4.7 4.8 4.8	4.7	NV
9	CA-CCO-637	96-H1518	95-7-243	Debitage	S33;W3	80-90	none	3.4 3.4 3.5 3.5 3.5 3.6	3.5	BH
10	CA-CCO-637	96-H1518	95-7-253	Debitage	S33;W3	90-100	none	2.4 2.5 2.5 2.5 2.6 2.6	2.5	NV
11	CA-CCO-637	96-H1518	95-7-258	Debitage	S33;W3	100-110	none	2.2 2.2 2.3 2.3 2.4 2.4	2.3	NV
12	CA-CCO-637	96-H1518	95-7-269A	Debitage	S33;W3	110-120	none	2.2 2.2 2.3 2.3 2.3 2.4	2.3	NV
13	CA-CCO-637	96-H1518	95-7-269B	Debitage	S33;W3	110-120	none	2.1 2.2 2.2 2.3 2.3 2.3	2.2	NV
14	CA-CCO-637	96-H1518	95-7-269C	Debitage	S33;W3	110-120	weathered	12.0 - 16.0	VW	NV
15	CA-CCO-637	96-H1518	95-7-148A	Debitage	S29;W3	70-80	Band 1	2.8 2.8 2.9 2.9 2.9 2.9	2.9	BH

Lab#	Site#	Job#	Catalog#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
15	CA-CCO-637	96-H1518	95-7-148A	Debitage	S29;W3	70-80	Band 2	5.8 5.9 5.9 5.9 6.0 6.0	5.9	BH
16	CA-CCO-637	96-H1518	95-7-183	Debitage	S31;W3	55-70	none	3.1 3.1 3.1 3.2 3.2 3.2	3.2	BH
17	CA-CCO-637	96-H1518	95-7-185	Biface fragment	S31;W3	70-80	none	3.4 3.4 3.5 3.6 3.6 3.6	3.5	BH
18	CA-CCO-637	96-H1518	95-7-212	Debitage	S31;W3	110-120	Band 1	1.8 1.8 1.8 1.9 1.9 1.9	1.9	BH
18	CA-CCO-637	96-H1518	95-7-212	Debitage	S31;W3	110-120	Band 2	2.1 2.2 2.2 2.3 2.3 2.3	2.2	BH
19	CA-CCO-637	96-H1518	95-7-220A	Debitage	S31;W3	120-130	weathered	3.4 3.4 3.4 3.4 3.5 3.5	3.4	NV
20	CA-CCO-637	96-H1518	95-7-220C	Debitage	S31;W3	120-130	none	2.5 2.5 2.6 2.6 2.6 2.7	2.6	NV
21	CA-CCO-637	96-H1518	95-7-220D	Debitage	S31;W3	120-130	none	3.2 3.1 3.3 3.3 3.3 3.4	3.3	NV
22	CA-CCO-637	96-H1518	95-7-220E	Debitage	S31;W3	120-130	none	1.8 1.8 1.9 1.9 2.0 2.0	1.9	NV
23	CA-CCO-637	96-H1518	95-7-228	Debitage	S31;W3	130-140	none	2.2 2.2 2.3 2.3 2.4 2.4	2.3	NV
1	CA-CCO-696	96-H1519	95-8-1812	Biface fragment	EXP 2		none	3.3 3.3 3.4 3.4 3.4 3.5	3.4	BH
2	CA-CCO-696	96-H1519	95-8-1	Debitage	BUR 26	MTX	none	2.5 2.5 2.5 2.5 2.5 2.5	2.5	NV
3	CA-CCO-696	96-H1519	95-8-28	Debitage	BUR 33		none	1.1 1.1 1.1 1.1 1.1 1.1	1.1	A
4	CA-CCO-696	96-H1519	95-8-68	Biface fragment	BUR 43		weathered	6.9 6.9 6.9 6.9 7.0 7.1	7.0	NV
5	CA-CCO-696	96-H1519	95-8-69	Debitage	BUR 43		none	2.7 2.8 2.8 2.8 2.8 2.8	2.8	NV
6	CA-CCO-696	96-H1519	95-8-71A	Debitage	BUR 45	MTX	none	2.5 2.5 2.5 2.6 2.6 2.6	2.6	NV
7	CA-CCO-696	96-H1519	95-8-71B	Debitage	BUR 45	MTX	none	2.5 2.5 2.5 2.5 2.6 2.6	2.5	NV
8	CA-CCO-696	96-H1519	95-8-77	Debitage	BUR 54	MTX	none	2.6 2.7 2.7 2.8 2.8 2.8	2.7	NV
9	CA-CCO-696	96-H1519	95-8-78A	Debitage	BUR 54	MTX	none	3.0 3.1 3.1 3.1 3.2 3.2	3.1	BL
10	CA-CCO-696	96-H1519	95-8-78B	Debitage	BUR 54	MTX	none	3.1 3.1 3.1 3.2 3.3 3.3	3.2	BL
11	CA-CCO-696	96-H1519	95-8-116	Debitage	BUR 81	MTX	none	3.0 3.0 3.0 3.0 3.0 3.1	3.0	BH
12	CA-CCO-696	96-H1519	95-8-132	Biface fragment	BUR 86	MTX	none	2.7 2.7 2.8 2.8 2.8 3.0	2.8	NV
13	CA-CCO-696	96-H1519	95-8-154	Biface fragment	BUR 104	EXP MTX	none	2.1 2.1 2.2 2.2 2.2 2.2	2.2	BH
14	CA-CCO-696	96-H1519	95-8-199A	Debitage	BUR 119	EXP MTX	none	4.0 4.1 4.1 4.1 4.1 4.2	4.1	NV
15	CA-CCO-696	96-H1519	95-8-258A	Debitage	BUR 17	EXP MTX	none	4.3 4.5 4.5 4.5 4.6 4.7	4.5	NV
16	CA-CCO-696	96-H1519	95-8-264B	Debitage	BUR 18	EXP MTX	none	2.7 2.7 2.7 2.7 2.7 2.9	2.7	NV
17	CA-CCO-696	96-H1519	95-8-264C	Debitage	BUR 18	EXP MTX	Band 1	2.8 2.9 2.9 2.9 2.9 2.9	2.9	NV
17	CA-CCO-696	96-H1519	95-8-264C	Debitage	BUR 18	EXP MTX	Band 2	3.3 3.3 3.4 3.4 3.4 3.4	3.4	NV
18	CA-CCO-696	96-H1519	95-8-288	Biface fragment	BUR 27	EXP	none	4.8 4.8 4.8 4.8 4.8 4.8	4.8	NV
19	CA-CCO-696	96-H1519	95-8-298	Biface fragment	BUR 30	EXP MTX	none	1.7 1.7 1.7 1.8 1.8 1.8	1.8	BH
20	CA-CCO-696	96-H1519	95-8-312	Biface fragment	BUR 37	MTX	Band 1	2.0 2.0 2.0 2.0 2.1 2.1	2.0	BH
20	CA-CCO-696	96-H1519	95-8-312	Biface fragment	BUR 37	MTX	Band 2	3.9 4.1 4.1 4.1 4.2 4.2	4.1	BH
21	CA-CCO-696	96-H1519	95-8-327	Debitage	BUR 48	EXP	none	3.7 3.8 3.8 3.9 3.9 3.9	3.8	NV
22	CA-CCO-696	96-H1519	95-8-335	Debitage	BUR 53	EXP	none	2.3 2.4 2.4 2.5 2.5 2.7	2.5	BH
23	CA-CCO-696	96-H1519	95-8-371	Debitage	BUR 82	EXP MTX	none	3.5 3.5 3.5 3.5 3.6 3.7	3.6	
24	CA-CCO-696	96-H1519	95-8-429	Biface fragment	BUR 139	EXP MTX	none	2.3 2.3 2.3 2.4 2.4 2.4	2.4	NV
25	CA-CCO-696	96-H1519	95-8-549A	Debitage	BUR 1	EXP MTX	weathered	8.2 8.4 8.4 8.4 8.5 8.6	8.4	NV
26	CA-CCO-696	96-H1519	95-8-585A	Debitage	FEAT 12		none	5.0 5.0 5.0 5.1 5.1 5.1	5.1	BH

Lab#	Site#	Job#	Catalog#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
27	CA-CCO-696	96-H1519	95-8-585B	Debitage	FEAT 12		none	2.6 2.6 2.7 2.7 2.7 2.7	2.7	NV
28	CA-CCO-696	96-H1519	95-8-613	Biface fragment	FEAT 20		none	2.6 2.6 2.6 2.6 2.6 2.7	2.6	NV
29	CA-CCO-696	96-H1519	95-8-634	Debitage	FEAT 17		none	3.1 3.3 3.3 3.3 3.3 3.4	3.3	NV
30	CA-CCO-696	96-H1519	95-8-1260	Debitage	EXP E-1		none	1.0 1.0 1.0 1.0 1.0 1.1	1.0	A
31	CA-CCO-696	96-H1519	95-8-1309	Biface fragment	TR 7-27-1	380-400BD	none	1.8 1.8 1.9 1.9 1.9 2.1	1.9	NV
1	High Water	96-H1544	High Water	Biface	Creek bank	70-90	none	3.6 3.8 3.8 3.8 3.9 3.9	3.8	BL? (v)
2	CA-CCO-458/H	96-H1544	95-2-101	DSN	N120/W108	20-30	none	1.9 1.9 2.0 2.0 2.0 2.0	2.0	NV (v)
3	CA-CCO-458/H	96-H1544	95-2-177	Serrated biface	N122/W106	20-floor	none	1.9 1.9 1.9 1.9 1.9 2.1	1.9	NV (v)
4	CA-CCO-458/H	96-H1544	95-2-603	Serrated point	N122/W105	20-30	none	2.8 2.8 2.9 2.9 2.9 3.0	2.9	NV (v)
5	CA-CCO-458/H	96-H1544	95-2-767	Serrated point	N122/W107	0-10	none	1.7 1.7 1.7 1.8 1.8 1.8	1.8	NV (v)
6	CA-CCO-458/H	96-H1544	95-2-826	Point	N126/W106	0-10	none	1.7 1.7 1.7 1.7 1.8 1.8	1.7	NV (v)
7	CA-CCO-458/H	96-H1544	95-2-839	Serrated point	N126/W106	10-20	none		VW	NV? (v)
8	CA-CCO-458/H	96-H1544	95-2-942	DSN preform?	N126/W106	40-50	none	1.7 1.7 1.7 1.7 1.7 1.7	1.7	NV (v)
9	CA-CCO-458/H	96-H1544	95-2-1057	Serrated point	N124/W105	30-40	none		DH	NV (v)
10	CA-CCO-458/H	96-H1544	95-2-1271	Point	N124/W109	20-30	none	1.0 1.0 1.0 1.0 1.1 1.1	1.0	NV (v)
11	CA-CCO-458/H	96-H1544	95-2-1510	Serrated point	N122/W104	20-30	none	2.9 2.9 3.0 3.0 3.0 3.0	3.0	NV (v)
12	CA-CCO-458/H	96-H1544	95-2-1770	Point	N126/W108	50-60	none		DH	NV (v)
13	CA-CCO-458/H	96-H1544	95-2-2357	Debitage	N126/W110	100-110	none	1.9 1.9 1.9 1.9 1.9 2.1	1.9	NV (v)
14	CA-CCO-458/H	96-H1544	95-2-2357B	Debitage	N126/W110	100-110	none	1.3 1.4 1.4 1.5 1.5 1.6	1.5	NV (v)
15	CA-CCO-458/H	96-H1544	95-2-2357C	Debitage	N126/W110	100-110	none		NVB	NV (v)
16	CA-CCO-458/H	96-H1544	95-2-2357D	Debitage	N126/W110	100-110	none	1.6 1.6 1.6 1.6 1.6 1.6	1.6	NV (v)
17	CA-CCO-458/H	96-H1544	95-2-2357E	Debitage	N126/W110	100-110	none	2.8 2.8 2.8 2.8 2.9 2.9	2.8	NV (v)
18	CA-CCO-458/H	96-H1544	95-2-2357F	Debitage	N126/W110	100-110	none	0.9 1.0 1.0 1.1 1.1 1.1	1.0	NV (v)
19	CA-CCO-458/H	96-H1544	95-2-2383	EMP	N126/W110	120-130	none	1.2 1.2 1.3 1.3 1.3 1.3	1.3	NV (v)
20	CA-CCO-458/H	96-H1544	95-2-2396	Debitage	N126/W110	130-140	none	1.1 1.1 1.1 1.1 1.1 1.1	1.1	NV (v)
21	CA-CCO-458/H	96-H1544	95-2-2396B	Debitage	N126/W110	130-140	Band 1	1.9 1.9 2.0 2.0 2.1 2.2	2.0	NV (v)
21	CA-CCO-458/H	96-H1544	95-2-2396B	Debitage	N126/W110	130-140	Band 2	4.3 4.4 4.4 4.4 4.5 4.5	4.4	NV (v)
22	CA-CCO-458/H	96-H1544	95-2-2652	Biface fragment	N204/E10	0-20	none	2.4 2.4 2.4 2.4 2.4 2.5	2.4	NV (v)
23	CA-CCO-458/H	96-H1544	95-2-2629	Biface fragment	N194/E20	0-20	none	3.0 3.0 3.1 3.1 3.1 3.1	3.1	NV (v)
24	CA-CCO-458/H	96-H1544	95-2-2638	Biface fragment	N198/E20	0-20	none	4.0 4.0 4.1 4.1 4.1 4.3	4.1	?
25	CA-CCO-458/H	96-H1544	95-2-2565	Biface fragment			none	3.0 3.0 3.0 3.0 3.1 3.1	3.0	BH (v)
26	CA-CCO-458/H	96-H1544	95-2-2689	Biface margin	N196/E20	40-50	none	3.1 3.2 3.2 3.3 3.3 3.3	3.2	BH (v)
27	CA-CCO-458/H	96-H1544	95-2-2696	Biface fragment	N196/E20	50-60	none	2.4 2.4 2.5 2.5 2.5 2.5	2.5	NV (v)
28	CA-CCO-458/H	96-H1544	95-2-2743	Biface fragment	N200/E20	40-50	none		DH	A (v)
29	CA-CCO-458/H	96-H1544	95-2-2756	Biface fragment	N204/E20	10-20	none	2.9 2.9 3.0 3.0 3.0 3.2	3.0	NV (v)
30	CA-CCO-458/H	96-H1544	95-2-2786	Biface margin?	N204/E20	60-70	none	2.3 2.3 2.4 2.4 2.5 2.5	2.4	NV (v)
31	CA-CCO-458/H	96-H1544	95-2-2789	Biface fragment	N204/E20	60-70	none	3.8 3.8 3.8 3.9 4.0 4.1	3.9	NV (v)
32	CA-CCO-637	96-H1544	95-7-192	Biface margin	S31/W3	80-90	none	3.4 3.5 3.5 3.5 3.5 3.7	3.5	NV (v)

Lab#	Site#	Job#	Catalog#	Description	Unit	Depth	Remarks	Measurements	Mean	Source
33	CA-CCO-637	96-H1544	95-7-395	Lanceolate-serrated	Dist. Area		weathered		NVB	A (v)
34	CA-CCO-637	96-H1544	95-7-417	Biface margin	BURIAL 7	BUR. MTX.	none	2.8 2.9 3.0 3.0 3.0 3.1	3.0	NV (v)
35	CA-CCO-637	96-H1544	95-7-422	Debitage	BURIAL 6	BUR. MTX.	weathered	8.0 8.0 8.0 8.0 8.1 8.2	8.1	NV (v)
36	CA-CCO-637	96-H1544	95-7-400	Point	BURIAL 7		none	2.8 2.8 2.9 3.0 3.1 3.1	3.0	NV (v)
37	CA-CCO-696	96-H1544	95-8-2017	Point	BURIAL 159		none	2.0 2.0 2.0 2.1 2.1 2.1	2.1	NV (v)
38	CA-CCO-696	96-H1544	95-8-3003	Biface	BURIAL 157		none	2.0 2.1 2.1 2.1 2.1 2.1	2.1	NV (v)
39	CA-CCO-696	96-H1544	95-8-612	Sh. lanceolate	Near Feat.20	100 BD	none	0.9 0.9 0.9 0.9 0.9 0.9	0.9	A (v)
40	CA-CCO-696	96-H1544	95-8-670	Biface fragment	S2.5/E22	100-110	none	1.1 1.2 1.2 1.2 1.2 1.4	1.2	?
41	CA-CCO-696	96-H1544	95-8-702	Biface fragment	S2.5/E20	40-50	none	3.8 3.8 3.8 3.8 3.8 3.8	3.8	?
42	CA-CCO-696	96-H1544	95-8-878	CCB base fragment	S6/W2	70-80	none	2.6 2.6 2.7 2.7 2.7 2.8	2.7	NV (v)
43	CA-CCO-696	96-H1544	95-8-902	Biface fragment	S8/E9.5	60-75	none	2.4 2.5 2.5 2.5 2.5 2.6	2.5	NV (v)
44	CA-CCO-696	96-H1544	95-8-969	Biface tip	S2.5/E28	0-10	none	1.1 1.1 1.1 1.1 1.1 1.2	1.1	A (v)
45	CA-CCO-696	96-H1544	95-8-998	Biface margin	S2.5/E28	70-80	weathered		DH	NV (v)
46	CA-CCO-696	96-H1544	95-8-1042	Biface fragment	S2.5/E25	130-140	weathered	1.1 1.1 1.2 1.2 1.3 1.4	1.2	NV (v)
47	CA-CCO-696	96-H1544	95-8-1050	Biface fragment	S2.5/E25	140-150	weathered		DH	?
48	CA-CCO-696	96-H1544	95-8-1106	Biface fragment	S9/E9	58-70	none	1.1 1.1 1.1 1.2 1.2 1.2	1.2	A (v)
49	CA-CCO-696	96-H1544	95-8-1172	Biface fragment	S9/E18	90-100	weathered		NVB	NV (v)
50	CA-CCO-696	96-H1544	95-8-1740	Debitage	Profile 6	80 BS	none	2.3 2.4 2.4 2.4 2.5 2.5	2.4	NV (v)
51	CA-CCO-696	96-H1544	95-8-1741	Biface end	Profile 6	95 BS	none	3.8 3.8 3.8 3.8 3.8 3.9	3.8	NV (v)
52	CA-CCO-696	96-H1544	95-8-1742	Biface	Profile 6	108 BS	none	1.1 1.1 1.2 1.2 1.2 1.2	1.2	A (v)
53	CA-CCO-696	96-H1544	95-8-1779	Point base	Exposure 1	60-100	none	4.3 4.3 4.3 4.3 4.3 4.3	4.3	NV (v)
54	CA-CCO-696	96-H1544	95-8-1825	CCB base	Exposure 2	80 BS	none	4.1 4.3 4.3 4.3 4.3 4.4	4.3	NV (v)
55	CA-CCO-696	96-H1544	95-8-1838	Biface	Exposure 2	60-70	none	1.8 1.9 1.9 1.9 2.0 2.0	1.9	NV? (v)
56	CA-CCO-696	96-H1544	95-8-1867	Biface tip	Exposure 4		none	1.8 1.8 1.9 1.9 2.0 2.1	1.9	NV? (v)
57	CA-CCO-696	96-H1544	95-8-1900	Biface tip	Exposure 5	60-100	none	4.3 4.3 4.3 4.3 4.3 4.3	4.3	NV? (v)
58	CA-CCO-696	96-H1544	95-8-1935	Biface fragment		1.5 BD	none	4.1 4.1 4.2 4.2 4.2 4.3	4.2	NV (v)
59	CA-CCO-696	96-H1544	95-8-2019	Biface			none	2.5 2.5 2.5 2.6 2.7 2.8	2.6	NV (v)
60	CA-CCO-696	96-H1544	95-8-3004A	Debitage	FLOT 125		none	2.0 2.0 2.0 2.0 2.0 2.2	2.0	NV (v)
61	CA-CCO-696	96-H1544	95-8-3004B	Debitage	FLOT 125		none	2.3 2.4 2.4 2.4 2.4 2.6	2.4	NV (v)
62	CA-CCO-696	96-H1544	95-8-3005	Debitage	FLOT 97		none	2.0 2.0 2.0 2.0 2.1 2.1	2.0	NV (v)
63	CA-CCO-696	96-H1544	95-8-3006	Debitage	FLOT 128	390-400	none	2.1 2.1 2.2 2.2 2.2 2.3	2.2	NV (v)
64	CA-CCO-696	96-H1544	95-8-3007	Debitage	FLOT 98		none	2.2 2.2 2.3 2.3 2.4 2.5	2.3	NV (v)
65	CA-CCO-696	96-H1544	95-8-3008	Debitage	FLOT 129	400-410	weathered		NVB	NV (v)
66	CA-CCO-696	96-H1544	95-8-3009	Debitage			none	2.0 2.0 2.0 2.0 2.0 2.2	2.0	NV? (v)
1	CA-CCO-696	96-H1553	95-8-3010	Debitage	NW-1	390-415	none	2.5 2.5 2.5 2.5 2.6 2.6	2.5	NV (v)

Geochemical Research Laboratory Letter Report 96-41

May 20, 1996

Mr. Jeff Rosenthal
Anthropological Studies Center
Sonoma State University
1801 East Cotati Avenue
Rohnert Park, CA 94928

Dear Jeff:

Enclosed with this letter you will find tables presenting x-ray fluorescence data generated from the analysis of 84 obsidian artifacts from two archaeological sites (CA-CCo-637, n=33 and CA-CCo-696, n=51) in the Los Vaqueros archaeological project area, Contra Costa County, California. One specimen submitted (cat. no. 95-8-371 from CCo-696) was too small (i.e. ≤ ca. 9-10 mm diameter) and/or too thin (i.e. ≤ ca. 1.5 mm thick) for generating reliable quantitative data by xrf. The xrf research reported here was conducted pursuant to your letter request of April 16, 1996.

Laboratory investigations were performed on a Spectrace™ 5000 (Tracor X-ray) energy dispersive x-ray fluorescence spectrometer equipped with a Rh x-ray tube, a 50 kV x-ray generator, 1251 pulse processor (amplifier), 1236 bias/protection module, a 100 mHz analog to digital converter (ADC) with automated energy calibration, and a Si(Li) solid state detector with 150 eV resolution (FWHM) at 5.9 keV in a 30 mm^2 area. The x-ray tube was operated at 35.0 kV, .25 mA, using a .127 mm Rh primary beam filter in an air path (except when a .25 mm^2 primary beam collimator was used) to generate x-ray intensity data for elements zinc (Zn Kα), gallium (Ga Kα), rubidium (Rb Kα), strontium (Sr Kα), yttrium (Y Kα), zirconium (Zr Kα), and niobium (Nb Kα). Barium (Ba Kα) intensities were generated by operating the x-ray tube at 50.0 kV, .35 mA, with a .63 mm copper (Cu) filter, while titanium (Ti Kα), and manganese (Mn Kα) and total iron ($Fe_2O_3^T$) intensities were generated by operating the x-ray tube at 15.0 kV, .22 mA, with a .127 mm aluminum (Al) filter in an air path. Iron vs. manganese (Fe Kα/Mn Kα) ratios were computed from data generated by operating the x-ray tube at 15.0 kV, .30 mA, with a .127 mm aluminum (Al) filter. All analyses were conducted at 300-600 seconds livetime, with counting time extended in instances when .25mm^2 primary beam collimation was employed on extremely small specimens requiring application of a sample mass correction algorithm. X-ray intensities were converted to concentration estimates employing a least-squares calibration line established for each element from analysis of up to 26 international rock standards certified by the U.S. Geological Survey, the U.S. National Institute of Standards and Technology (formerly National Bureau of Standards), the Geological Survey of Japan, and the Centre de Recherches Petrographiques et Geochimiques (France). Further details pertaining to x-ray tube operating conditions and calibration appear in Hughes (1988).

All trace element values on the tables (except Fe/Mn ratios) are expressed in quantitative units (i.e. parts per million [ppm] and weight percent composition), and these were compared directly to values for known obsidian sources that appear in Bowman et al. (1973), Hughes (1983, 1985, 1988, 1989, 1994), Jack (1976), and Jackson (1989). Artifacts were assigned to a parent obsidian type if diagnostic trace element concentration values (i.e., ppm values for Rb, Sr, Y, Zr and, when necessary Ba) corresponded at the 2-sigma level. Stated differently,

artifact-to-obsidian source (geochemical type) matches were considered reliable if diagnostic mean measurements for artifacts fell within 2 standard deviations of mean values for source standards. The term "diagnostic" is used here to specify those trace elements that are well-measured by x-ray fluorescence, and whose concentrations show low intra-source variability and marked variability across sources (see Hughes 1990, 1993). Although Zn, Ga, and Nb ppm concentrations also were measured and reported for each specimen, they are not considered "diagnostic" because they don't usually vary significantly across obsidian sources (see Hughes 1982, 1984). This is particularly true of Ga, which occurs in concentrations between 10-30 ppm in nearly all sources in the study area. Zn ppm values are always high in Zr-rich, Sr-poor peralkaline volcanic glasses (like those in northwestern Nevada, where concentrations are >150 ppm), but otherwise they do not vary dramatically between sources.

The trace element composition measurements presented in the enclosed tables are reported to the nearest ppm to reflect the resolution capabilities of non-destructive energy dispersive x-ray fluorescence spectrometry for non-destructive quantitative analysis. The resolution limits of the present x-ray fluorescence instrument for the determination of Zn is about 3 ppm; Ga about 2 ppm; for Rb about 3 ppm; for Sr about 3 ppm; Y about 2 ppm; Zr about 3 ppm; and Nb about 2 ppm (see Hughes [1994] for other elements). When counting and fitting error uncertainty estimates (the "±" value in the table) for a sample are greater than calibration-imposed limits of resolution, the larger number is a more conservative reflection of composition variation and measurement error arising from differences in sample size, surface and x-ray reflection geometry.

The obsidian source attribution for each specimen appears in the accompanying tables; the general geographic location of each source area appears in Jack (1976: Fig. 11.1b). Xrf data indicate that 62 of these specimens (25 from CCo-637, 37 from CCo-696) have the same trace element profile as obsidians of the Napa Valley (*sensu* Jackson 1989) geochemical type, 15 (6 from CCo-637, 9 from CCo-696) match the Bodie Hills trace element signature, 4 (one from CCo-637, three from CCo-696) conform to the chemical signature of Annadel obsidian, and two flakes from CCo-696 match the fingerprint of Borax Lake obsidians (cf. Bowman et al. 1973: Table 3; Jack 1976: Table 11.3, 11.5). A single sample from CCo-637 was fashioned from obsidian of the Lookout Mountain variety, Casa Diablo area (cf. Hughes 1994: Table 2, Figure 2).

I hope this information will help in your analysis and interpretation of these site materials. Please contact me at my laboratory (phone: [415] 851-1410) if I can provide any further assistance or information.

Sincerely,

Richard E. Hughes, Ph.D.
Director, Geochemical Research Laboratory

encl. CA-CCo-637 & 696 Xrf Data

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Trace and Selected Minor Element Concentrations **Ratio**

Cat. Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Fe/Mn	Source (Chemical Type)
CCo-637,	75	22	205	6	50	243	11	nm	nm	nm	nm	nm	Napa Valley
Specimen V*	±4	±3	±3	±3	±2	±4	±2						
CCo-637,	82	22	208	8	52	260	13	nm	nm	nm	nm	nm	Napa Valley
Specimen Z*	±4	±3	±3	±3	±2	±4	±2						
CCo-637,	57	16	203	96	15	101	17	525	nm	nm	nm	nm	Bodie Hills
Specimen CC*	±3	±3	±3	±3	±2	±3	±2	±13					
CCo-637,	88	20	210	7	51	248	12	nm	nm	nm	nm	nm	Napa Valley
Specimen DD*	±4	±3	±3	±3	±2	±4	±2						
CCo-637,	75	22	202	10	50	248	11	nm	nm	nm	nm	nm	Napa Valley
Specimen EE*	±4	±3	±3	±3	±2	±4	±2						
CCo-637,	76	20	194	6	48	241	10	nm	nm	nm	nm	nm	Napa Valley
Specimen FF*	±3	±3	±3	±3	±2	±3	±2						
CCo-637,	78	17	188	5	49	232	11	nm	nm	nm	nm	nm	Napa Valley
Specimen GG*	±7	±3	±3	±3	±2	±4	±2						
CCo-637,	93	21	195	8	50	236	10	nm	nm	nm	nm	nm	Napa Valley
Specimen HH*	±4	±3	±3	±3	±2	±4	±2						
CCo-637,	85	21	209	7	49	250	11	nm	nm	nm	nm	nm	Napa Valley
Specimen II*	±4	±3	±3	±3	±2	±4	±2						
CCo-637,	92	28	210	8	54	248	12	nm	nm	nm	nm	nm	Napa Valley
Specimen JJ*	±4	±3	±4	±3	±2	±4	±2						
CCo-696,	79	16	187	7	48	233	11	nm	nm	nm	nm	nm	Napa Valley
Specimen A	±4	±3	±3	±3	±2	±4	±2						
CCo-696,	50	17	181	99	14	100	15	644	nm	nm	nm	nm	Bodie Hills
Specimen B	±5	±3	±4	±3	±2	±4	±2	±12					
CCo-696,	82	17	202	6	55	260	9	nm	nm	nm	nm	nm	Napa Valley
Specimen C	±5	±4	±4	±3	±2	±4	±2						
CCo-696,	106	20	228	7	53	259	10	nm	nm	nm	nm	nm	Napa Valley
Specimen D*	±5	±3	±4	±3	±2	±4	±2						
CCo-696,	75	23	203	6	51	255	12	nm	nm	nm	nm	nm	Napa Valley
Specimen F	±5	±3	±4	±3	±2	±4	±2						
CCo-696,	77	18	195	5	45	231	11	nm	nm	nm	nm	nm	Napa Valley
Specimen H	±5	±4	±4	±3	±2	±4	±2						
CCo-696,	72	17	183	5	48	227	11	nm	nm	nm	nm	nm	Napa Valley

All values in parts per million (ppm) except total iron (in weight percent) and Fe/Mn ratios; ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 300 and 600 (*) seconds livetime; nm = not measured.

Cat. Number	Trace and Selected Minor Element Concentrations											Ratio	Source
	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Fe/Mn	(Chemical Type)
Specimen K*	±4	±3	±3	±3	±2	±4	±2						
CCo-696,	73	22	188	6	49	246	11	nm	nm	nm	nm	nm	Napa Valley
Specimen J	±4	±3	±3	±3	±2	±4	±2						
CCo-696,	78	16	201	6	49	244	11	nm	nm	nm	nm	nm	Napa Valley
Specimen N	±4	±3	±3	±3	±2	±4	±2						
CCo-696,	67	17	199	7	51	248	10	nm	nm	nm	nm	nm	Napa Valley
Specimen O	±5	±4	±4	±3	±2	±4	±2						
CCo-696,	80	18	199	7	50	250	13	nm	nm	nm	nm	nm	Napa Valley
Specimen R	±5	±4	±4	±3	±2	±4	±2						
CCo-696,	82	18	208	8	56	251	13	nm	nm	nm	nm	nm	Napa Valley
Specimen S*	±4	±3	±3	±3	±2	±4	±2						
CCo-696,	83	21	209	7	51	252	13	nm	nm	nm	nm	nm	Napa Valley
Specimen T*	±4	±3	±3	±3	±2	±4	±2						
CCo-696,	69	15	192	5	48	247	12	nm	nm	nm	nm	nm	Napa Valley
Specimen U	±4	±3	±3	±3	±2	±4	±2						

All values in parts per million (ppm) except total iron (in weight percent) and Fe/Mn ratios; ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 300 and 600 (*) seconds livetime; nm = not measured.

Cat. Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Ratio Fe/Mn	Source (Chemical Type)
	Trace and Selected Minor Element Concentrations												
CCo-637, 80	67 ±4	17 ±3	187 ±3	5 ±3	47 ±2	228 ±4	10 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 81	68 ±5	18 ±3	191 ±4	8 ±3	49 ±2	246 ±4	9 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 82	78 ±4	13 ±3	196 ±3	6 ±3	48 ±2	242 ±4	10 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 99a*	83 ±4	18 ±3	206 ±3	6 ±3	48 ±2	250 ±4	10 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 99b*	73 ±4	19 ±3	142 ±3	82 ±3	18 ±2	167 ±4	14 ±2	nm	897 ±21	330 ±13	1.49 ±.12	nm	Lookout Mountain, Casa Diablo area
CCo-637, 121a*	69 ±4	19 ±3	181 ±3	6 ±3	48 ±2	229 ±4	8 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 121b	83 ±4	21 ±3	141 ±3	52 ±3	52 ±2	286 ±4	10 ±2	nm	nm	nm	nm	nm	Annadel
CCo-637, 139	91 ±4	16 ±3	175 ±3	6 ±3	46 ±2	224 ±4	9 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 148a	86 ±4	15 ±3	175 ±3	94 ±3	13 ±2	100 ±3	18 ±2	601 ±13	nm	nm	nm	nm	Bodie Hills
CCo-637, 183	39 ±4	14 ±3	178 ±3	97 ±3	14 ±2	99 ±3	15 ±2	593 ±13	nm	nm	nm	nm	Bodie Hills
CCo-637, 185	40 ±5	12 ±4	176 ±3	95 ±3	16 ±2	94 ±4	13 ±2	621 ±14	nm	nm	nm	nm	Bodie Hills
CCo-637, 212*	52 ±4	18 ±3	200 ±3	105 ±3	14 ±2	102 ±3	12 ±2	595 ±13	nm	nm	nm	nm	Bodie Hills
CCo-637, 220a	76 ±4	18 ±3	186 ±3	6 ±3	49 ±2	230 ±4	9 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 220c	63 ±4	14 ±3	198 ±3	6 ±3	51 ±2	245 ±4	9 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 220d	70 ±5	17 ±4	188 ±4	8 ±3	50 ±2	238 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 220e	68 ±5	19 ±3	190 ±4	6 ±3	49 ±2	238 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley

All values in parts per million (ppm) except total iron (in weight percent) and Fe/Mn ratios; ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 300 and 600 (*) seconds livetime; nm = not measured.

Cat. Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Ratio Fe/Mn	Source (Chemical Type)
	Trace and Selected Minor Element Concentrations												
CCo-637, 228	70 ±5	13 ±4	188 ±4	5 ±3	47 ±2	230 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 243	37 ±4	13 ±3	187 ±3	98 ±3	14 ±2	104 ±3	14 ±2	558 ±13	nm	nm	nm	nm	Bodie Hills
CCo-637, 253b	107 ±5	18 ±4	182 ±4	7 ±3	48 ±2	231 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 258	63 ±4	17 ±3	198 ±3	5 ±3	50 ±2	245 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 269a	129 ±5	20 ±3	193 ±4	7 ±3	48 ±2	245 ±4	9 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 269b*	76 ±4	20 ±3	192 ±3	7 ±3	46 ±2	229 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-637, 269c	89 ±5	19 ±3	183 ±4	8 ±3	49 ±2	238 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 1	71 ±5	19 ±4	200 ±4	8 ±3	51 ±2	244 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 28	77 ±4	21 ±3	136 ±3	51 ±3	53 ±2	281 ±4	8 ±2	nm	nm	nm	nm	nm	Annadel
CCo-696, 68	64 ±4	17 ±3	177 ±3	6 ±3	46 ±2	226 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 69	74 ±4	18 ±3	200 ±3	7 ±3	51 ±2	247 ±4	10 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 71a	74 ±5	24 ±4	202 ±4	5 ±3	51 ±2	242 ±4	10 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 71b	66 ±4	19 ±3	192 ±3	5 ±3	49 ±2	241 ±4	10 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 77	65 ±4	24 ±3	196 ±4	7 ±3	50 ±2	242 ±4	13 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 78a	58 ±5	19 ±4	243 ±4	10 ±3	48 ±2	102 ±4	13 ±2	nm	488* ±13	205* ±12	1.11* ±.12	nm	Borax Lake
CCo-696, 78b	51 ±4	17 ±3	234 ±4	10 ±3	48 ±2	97 ±3	11 ±2	nm	447* ±12	197* ±12	1.09* ±.12	nm	Borax Lake

All values in parts per million (ppm) except total iron (in weight percent) and Fe/Mn ratios; ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 300 and 600 (*) seconds livetime; nm = not measured.

Cat. Number	Trace and Selected Minor Element Concentrations											Ratio	Source
	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Fe/Mn	(Chemical Type)
CCo-696, 116	48 ±4	15 ±3	186 ±3	99 ±3	13 ±2	110 ±3	15 ±2	585 ±13	nm	nm	nm	nm	Bodie Hills
CCo-696, 132	58 ±4	14 ±3	183 ±3	6 ±3	43 ±2	219 ±4	8 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 154	50 ±5	15 ±4	181 ±4	99 ±3	16 ±2	101 ±4	14 ±2	631 ±14	nm	nm	nm	nm	Bodie Hills
CCo-696, 199a	65 ±4	15 ±3	187 ±3	6 ±3	46 ±2	227 ±4	9 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 258a	75 ±4	18 ±3	188 ±4	6 ±3	47 ±2	232 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 264b	72 ±5	18 ±4	196 ±4	8 ±3	45 ±2	239 ±4	8 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 264c	75 ±5	18 ±4	197 ±4	5 ±3	48 ±2	236 ±4	14 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 288	62 ±4	14 ±3	176 ±3	6 ±3	45 ±2	226 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 298	41 ±5	15 ±3	179 ±3	96 ±3	16 ±2	91 ±3	14 ±2	624 ±13	nm	nm	nm	nm	Bodie Hills
CCo-696, 312	42 ±4	15 ±3	180 ±3	97 ±3	15 ±2	104 ±3	14 ±2	617 ±13	nm	nm	nm	nm	Bodie Hills
CCo-696, 327	72 ±4	16 ±3	192 ±3	8 ±3	49 ±2	240 ±4	13 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 335	45 ±4	14 ±3	180 ±3	101 ±3	14 ±2	99 ±3	15 ±2	611 ±13	nm	nm	nm	nm	Bodie Hills
CCo-696, 429	72 ±4	18 ±3	191 ±3	6 ±3	50 ±2	246 ±4	10 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 549a	86 ±4	20 ±3	195 ±4	8 ±3	48 ±2	232 ±4	9 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 585a	51 ±4	14 ±3	184 ±3	98 ±3	14 ±2	100 ±3	16 ±2	637 ±13	nm	nm	nm	nm	Bodie Hills
CCo-696, 585b	72 ±5	18 ±4	189 ±4	6 ±3	49 ±2	228 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley

All values in parts per million (ppm) except total iron (in weight percent) and Fe/Mn ratios; ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 300 and 600 (*) seconds livetime; nm = not measured.

Cat. Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Ratio Fe/Mn	Source (Chemical Type)
	Trace and Selected Minor Element Concentrations												
CCo-696, 612	71 ±4	18 ±3	134 ±3	48 ±3	51 ±2	273 ±4	11 ±2	nm	nm	nm	nm	nm	Annadel
CCo-696, 613	72 ±5	17 ±4	183 ±4	5 ±3	45 ±2	239 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 634	58 ±5	20 ±3	183 ±3	7 ±3	44 ±2	219 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 1199	73 ±4	16 ±3	180 ±3	7 ±3	45 ±2	224 ±4	12 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 1200	70 ±4	16 ±3	186 ±3	6 ±3	47 ±2	232 ±4	10 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 1219	62 ±4	20 ±3	184 ±3	5 ±3	46 ±2	233 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 1260*	88 ±4	18 ±3	137 ±3	52 ±3	52 ±2	268 ±4	8 ±2	575 ±15	nm	nm	nm	nm	Annadel
CCo-696, 1296	39 ±4	14 ±3	176 ±3	97 ±3	12 ±2	98 ±3	14 ±2	614 ±13	nm	nm	nm	nm	Bodie Hills
CCo-696, 1297	69 ±4	22 ±3	198 ±3	7 ±3	53 ±2	242 ±4	11 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 1309	66 ±5	15 ±4	184 ±4	10 ±3	46 ±2	240 ±4	10 ±2	nm	nm	nm	nm	nm	Napa Valley
CCo-696, 1812	34 ±5	12 ±3	173 ±3	90 ±3	14 ±2	99 ±3	13 ±2	558 ±13	nm	nm	nm	nm	Bodie Hills
CCo-696, 1838	56 ±5	13 ±3	171 ±3	6 ±3	45 ±2	219 ±4	9 ±2	nm	nm	nm	nm	nm	Napa Valley

All values in parts per million (ppm) except total iron (in weight percent) and Fe/Mn ratios; ± = pooled estimate (in ppm) of x-ray counting uncertainty and regression fitting error at 300 and 600 (*) seconds livetime; nm = not measured.

APPENDIX G

ROCK IDENTIFICATION

PETROGRAPHIC ANALYSIS OF ARTIFACTS FROM THE PROPOSED LOS VAQUEROS RESERVOIR SITE- ARTIFACTS FROM LOT # CCO-458 AND CCO-637

By Edward Muller
May 15, 1996

INTRODUCTION

The purpose of this analysis is to identify the rock type of several artifacts taken from the proposed Los Vaqueros Reservoir site. I used both hand sample and thin-section techniques to determine the rock types. I used IUGS nomenclature for naming the igneous rocks, and I will use the term hornfels in the naming of any unfoliated, aphanitic metamorphic rocks.

ROCK IDENTIFICATION

Lot CCO-458

Artifact <u>Catalog #</u>	
95-2-2104	The rock ia a dacite ash tuff, containing about 20% crystal fragments, of plagioclase, quartz, and Kspar, most 1mm or less in size, in a very fine-grained banded ash matrix. Part of the outer surface of the artifact was well rounded and weathered to a light tan color, suggesting stream erosion.
95-2-2112	The rock is a plagioclase quartz phyric dacite, with 8% 0.25-2mm subtabular subhedral plagioclase, 10% 0.25-1.5mm equant anhedral quartz, in a fine-grained matrix consisting mostly of quartzofeldspathic material, with some iron oxide minerals, including hematite.
95-2-2654	The rock is an epidote quartz hornfels, with 20% very fine-grained anhedral epidote, mostly in aggregate clusters, and 80% very fine to 0.5mm equant anhedral interlocking quartz. The epidote mainly occurs in veins or by surrounding some of the larger quartz crystals.
95-2-2663A	The rock is a quartz kspar plagioclase phyric rhyolite, with 5% 0.5x1mm rectangular quartz, found almost entirely within 2 large veins, 10% 0.25-0.50x

Artifact <u>Catalog #</u>	
	0.5-2mm lathlike subhedral kspar, and 15% 0.25-0.75x 0.5-2mm lathlike subhedral plagioclase (An_{20}), in a very fine-grained quartzofeldspathic matrix. The rock also contains <1% 0.5mm needle-like anhedral biotite, and <1% 0.5mm equant anhedral unidentified opaque mineral.
95-2-2676	The rock is a biotite quartz diorite, with 10% 0.05-0.2mm equant anhedral quartz, 15% 0.1-0.4x 0.2-2mm columnar euhedral to subhedral biotite, and 74% 0.05-1mm acicular to tabular euhedral to anhedral plagioclase (An_{30}). The rock also contains 1% 0.1mm equant anhedral unidentified opaque mineral.
95-2-2740	The rock is a biotite andesitic welded lapilli ash tuff, with 6% 0.25-1mm tabular anhedral biotite, 6% 0.1-0.5mm equant anhedral quartz, and 17% 0.25-2mm lathlike subhedral plagioclase, in a flow banded quartzofeldspathic and glassy matrix. the rock also contains 15% subangular lithic fragments of various sizes up the 3mm, and <1% 0.25 equant anhedral unidentified opaque mineral. Much of the biotite has been altered to chlorite, which tends to mantle the biotite crystals, and has also altered to some degree to epidote. Most of the interiors of the plagioclase has been altered to saussurite.
95-2-2741	The rock is a Kspar plagioclase quartz phyric dacite, with 5% 0.1-0.5mm tabular subhedral Kspar, 5% 0.25-1mm lathlike subhedral plagioclase, and 10% 0.25-1mm equant anhedral quartz, in a matrix consisting of very fine acicular feldspars, plus quartz and glass. Rock also contains small amounts of sericite and chlorite. The outer surface of the hand sample was well rounded, possibly by stream erosion, and the worn surface contained numerous 1-5mm circular pit marks.
95-2-2750	The rock is an epidote quartz hornfels, with 20% 0.01 mm acicular anhedral epidote and 80% 0.05-0.5mm equant anhedral interlocking quartz. Most of the quartz is extremely very fine-grained, but the rock is crossed by several veins in which larger (0.2-0.5mm) quartz exists. the epidote tends to form into linear clots or veins of radiating aggregates.

Artifact Catalog #	
95-2-2781	The rock is a hypidiomorphic porphyritic hornblende granite, with 5% 0.25-1mm subtabular anhedral hornblende, 20% 0.25-1x 0.5-4mm tabular subhedral Kspar, 20% 0.5-2mm equant anhedral quartz, and 50% 0.25-1x 0.25-5mm lathlike euhedral to subhedral plagioclase (An_{30}). The rock also contains small amounts 0.5mm equant anhedral unidentified opaque mineral, and small clots of a reddish mineral, probably some kind of iron oxide. The rock has been extremely altered, with most of the interiors of the feldspars being filled with saussurite, and much of the margins of the hornblende altered to chlorite.

Note: Artifacts # 95-2-2663B, 2683, and 2724 are all very similar to 95-2-2740, and I consider them all to be of the same rock type.

Lot CCO-637

Artifact Catalog #	
95-7-398	The rock is a quartz hornfels, consisting almost entirely of very fine-grained quartz matrix, crossed by numerous course-grained (up to 1mm) veins of interlocking quartz, some of the veins 2mm wide. The rock also contains very small amounts of 0.1mm hematite, and most of the rock has a red and yellow iron oxide stain.
95-7-399	This rock is the same as 95-7-398.
95-7-237	The rock is a crossite epidote quartz hornfels, with 30% 0.05-.5mm long acicular anhedral crossite, 30% 0.05-1mm long acicular anhedral epidote, and 40% 0.1-1mm equant anhedral interlocking quartz. Both the epidote and the crossite forms aggregates of radiating fibers.
95-7-248	The rock is a quartz hornfels, consisting almost entirely of very fine to 0.25mm equant anhedral interlocking quartz. The rock is crossed by several quartz veins, up to 0.5mm wide. The rock also contains a fairly abundant amount of a reddish, nearly opaque mineral, probably an iron oxide.

Artifact Catalog #	
95-7-273	The rock is a quartz- rich siltstone, with 20% 0.1-0.2mm angular fragments of quartz in a silty matrix.
95-7-329	The rock is a epidote pumpellyite prehnite quartz hornfels, with 30% 0.25-0.5mm equant anhedral interlocking quartz and nearly equal proportions of epidote, pumpellyite, and prehnite. The epidote, pumpellyite, and prehnite all form aggregates of radiating acicular very fine-grained crystals, with some of the epidote forming tabular subhedral crystals.
95-7-357	The rock is a plagioclase Kspar quartz phyric rhyolite, with 5% 0.25-1mm equant anhedral plagioclase (An_{30}), 20% 0.25-3mm equant to tabular anhedral kspar, and 20% 0.25-3mm equant anhedral quartz, in a very fine-grained quartzofeldspathic and glassy matrix. Most of the phenocrysts are fragmental.

DISCUSSION AND RECOMMENDATIONS

Of 19 artifacts that I have identified, 10 were found to be volcanic rocks, and 7 were low-grade metamorphic rocks, comprised mostly of quartz. As pertaining to volcanic rocks, dacites and rhyolites are found throughout Northern Diablo Range vicinity, associated with the volcanism that occurred between the Late Oligocene through Pliocene. The hornfels were probably sandstones or cherts that were metamorphosed as low-grade facies associated with subduction process, and the rocks were probably derived from the Franciscan Complex.

All the volcanic and metamorphic rocks described above are fairly common within the vicinity of the Northern Diablo Range, any study to determine the exact source of any of these rocks would probably require the use of geochemical techniques such as X-Ray diffraction. One note of caution, however, is that these rocks are also commonly found within some of the younger sedimentary formations of the area, particularly the Livermore Formation, and two of the samples described above did show rounding consistent with stream erosion. Therefore, the indigenous people may have collected many of these rocks as stream gravel, and not from the ultimate source of the rock.

APPENDIX H

PLANT REMAINS

PLANT REMAINS

Eric Wohlgemuth

This chapter documents results of analysis of 55 flotation samples, extracted from 967.2 liters of sediment, from five archaeological sites excavated prior to construction of the Los Vaqueros Reservoir in eastern Contra Costa County. Analysis focused on the identification of charred seed, fruit, and underground part remains. Wood charcoal identification was not attempted.

These data comprise an unparalleled opportunity to examine changes in plant resource use over most of the past 9,500 years of central California prehistory. Robust samples of archaeobotanical data are available from five securely dated archaeological site components. A buried component at CCO-696 Deep dates to the early Holocene, with three radiocarbon dates (calibrated, as are all subsequently listed dates) ranging from 9870 $\pm$60 to 7409$\pm$80 B.P. Site CCO-637 appears to be a temporary campsite dating to ca. 5800-2600 B.P. CCO-696 West appears to have been a residential community occupied mostly from 2800-1300 B.P.; charcoal from one burial was radiocarbon-assayed at 690$\pm$40 B.P. Site CCO-459 is the most functionally distinctive deposit, as it is limited to processing features in a small buried deposit adjacent to a bedrock milling station. Two radiocarbon dates, 1265$\pm$70 and 605$\pm$60 B.P., were returned from CCO-459 features. A single radiocarbon date of 465$\pm$100 was returned burial-associated charcoal at CCO-458, a small residential site dating to the Emergent period.

RESEARCH CONTEXT

The most meaningful analyses of diachronic changes in plant remains are those made from the same site or locality. In one locality, changes in economic behavior can be more easily isolated from variability in habitat. The Los Vaqueros Project constitutes only the fifth locality-specific diachronic study to date of plant remains from central California. Results from three of the four previous localities are presented in Wohlgemuth (1996a), the fourth in Wohlgemuth (1996b), and additional data germane to these studies is found in Wohlgemuth (1996c). These findings are summarized below.

The first attempt to integrate flotation data from central California focused upon 11 archaeological sites in the North Coast Ranges and the Central Valley (Wohlgemuth 1996a). This initial study attempted to test intensification models proposed by Basgall (1987) and Basgall and Bouey (1991) from studies of grinding tools and settlement patterning. Basgall (1987) suggested that acorns are an expensive resource, the intensive use of which did not begin until population/resource dynamics served to constrict people to less mobile foraging in smaller territories. In the North Coast Ranges and the Central Valley, this shift is documented at the inception of the Upper Archaic (ca. 2,500-1,000 B.P.) of the central California sequence, when mortars and pestles replaced handstones and millingstones as the predominate food-grinding apparatus. Subsequent studies of grinding tools and settlement locations at Warm Springs Dam in the North Coast Ranges confirmed that acorns were first intensively exploited during the Upper Archaic, while subsequent populations are inferred to have made intensive use of both acorns and a diverse set of plant foods (Basgall and Bouey 1991).

Wohlgemuth (1996a) found that seed assemblages of two Middle Archaic (ca. 5,000-2,500 B.P.) sites feature moderate amounts of acorn nutshell and small numbers of remains of nuts, berries, and small seeds. A generalized economy has been inferred for the Middle Archaic, primarily due to contrasts with acorn-dominated assemblages of six sites dated to the Upper Archaic. Upper Archaic sites feature dense accumulations of acorn nutshell but lack commensurate numbers of small seeds.

The dramatic increase in acorn residue has been interpreted as evidence of an economy based upon the intensive use and storage of acorns. In contrast, three Emergent period (ca. 1000-100 B.P.) sites described include a plethora of small seeds in addition to abundant acorn nutshell. This has been interpreted as representing a new, focused use of small-seeded annual and perennial herbs, brought on by the inadequacy of acorns to maintain expanding populations. The process may resemble more extensification--subsistence expansion to include a new niche--than intensification, which refers to increased production of previously exploited resources (Beaton 1991). While the data are preliminary, they exhibit consistent trends in sites of the same age for all three localities, and appear to conform to the implications of the intensification models (Wohlgemuth 1996a).

Subsequent archaeobotanical investigations in central California have amplified and confirmed these trends. Emergent period site CA-SOL-356, located in Green Valley adjacent to Middle Archaic site SOL-315 and Upper Archaic site SOL-355 (described in Wohlgemuth [1996a]), also features dense accumulations of both acorns and small seeds (Wohlgemuth 1996c). An additional set of contrasting assemblages has been obtained from sites dating to the Archaic/Emergent transition (CA-ALA-42) and the Emergent period (ALA-555) in Pleasanton, 15 miles southwest of the Los Vaqueros locale. Of interest is the finding of abundant acorn and small seed residues at ALA-42, the earliest well-documented case of the Emergent period plant food economy known to date. Unfortunately, no radiocarbon dates are yet associated with the ALA-42 data, so a minimum age for this economy has not been determined. The apparent increase in use of seeds at ALA-555 may indicate a greater use of plants of seasonal and perennial wetlands near the end of the central California sequence, but the location of the site adjacent to Willow Marsh--habitat apparently lacking at ALA-42--clouds this finding. Finally, a cremation sampled at ALA-555 contains exceptionally high frequencies of hulled acorn kernels and two small seeds, farewell to spring (*Clarkia* sp.), and an unidentified member of the sunflower family (Asteraceae). These remains clearly represent offerings of everyday foods to the deceased, as all three taxa were found in virtually every sample from the features and midden deposit at ALA-555. This pattern has been interpreted as representing a prehistoric cognitive parallel to the intensification model predictions for the Emergent period, in that both acorns and at least these two types of small seeds were apparently viewed as important foods (Wohlgemuth 1996b).

RESEARCH ISSUES

The preservation of plant remains from well-dated component areas throughout a prolonged cultural sequence at Los Vaqueros offers an unprecedented opportunity to examine changes in plant resource use. Following Basgall (1987) and Wohlgemuth (1996a), it is predicted that progressive reduction in mobility and territorial range would foster conditions for resource intensification seen elsewhere in central California. Early Holocene CCO-696 Deep is predicted to evidence the least constricted economic mode and to feature a generalized seed assemblage lacking focus on particular resources. Occupation at site CCO-637 is coeval with the central California Middle Archaic period generalized assemblages (Wohlgemuth 1996a), and plant remains are predicted to be generalized as well. CCO-696 West is coeval with Upper Archaic sites, which consistently show a dramatic increase in acorn nutshell debris, often with a concomitant decline in the frequency of small seeds; this can serve as a working hypothesis for this component. Emergent period CCO-458 and CCO-459 are hypothesized to show intensive use of both acorns and small seeded resources.

Complicating this simple scheme is obvious functional differentiation between components. Site CCO-637, and probably CCO-696 Deep, appear to be temporary camps, in contrast to residential sites CCO-696 West and -458. The temporary camps may feature more limited seed assemblages that

may in turn provide evidence of seasons of occupation and/or resource focus that tends to be obscured in residential communities occupied for longer stays. The strong association of CCO-459 with plant food processing suggests that plant remains found will be biased towards resources habitually pulverized in bedrock mortars. Conventional wisdom in California, following Kroeber (1925), predicts that acorn debris may be more abundant at CCO-459, although this is dependent on the frequency of processing unshelled or shelled acorns. But it can be predicted that small seeds will be less abundant at CCO-459 than at -458. Other variables that must be controlled at all sites to assess changes in adaptive mode include sampling and preservation biases.

SAMPLING AND PROCESSING STRATEGY

Samples were collected from all excavated features. Some burial matrix samples were also collected, notably from CCO-637. Non-feature sediments were also collected as column samples from excavation unit or backhoe exposure walls. Sample size was increased for older component sites in an effort to offset the low density of charred materials in older deposits in central California (Wohlgemuth 1996a). In all, 92 samples comprising nearly 1.5 m^3 of deposit were collected from the project sites.

Flotation samples were processed under the direction of William Stillman, employing a manual technique used throughout central California (Wohlgemuth 1989). Buoyant light fraction was collected using 40 mesh/inch (0.4 mm) screen, while heavy fraction was washed through 3 mm (1/8") and 1 mm (window screen) mesh. To estimate recovery bias, selected heavy fractions were washed through 0.7 mm mesh, and measured lots of 50 modern charred poppy seeds were added to these and other samples. Unfortunately, time and budgetary constraints precluded collecting these data. Previous measurements of technique effectiveness have demonstrated recovery of 85 to 95% of dense nutshell and berry pits, and more than 98% of small seeds. Hence only the light fraction material was analyzed.

Light fraction was size sorted using 2 mm, 1 mm, 0.7 mm, and 0.5 mm mesh. Analysis was performed by the Jonathon Legare, Cassandra Hensher, Steven Moore, and the author. All sorting and identification was verified by the author. Analysis was limited to material larger than 0.7 mm. Due to the very high frequency of seed and fruit remains in most samples, redundancy of data was quickly reached during sorting. Subsampling procedures were undertaken for many samples, particularly for 1 mm and 0.7 mm grades, most often for the rich accumulations in the more recent sites CCO-458 and -459 (Table 1). Estimates of total sample contents were calculated from the subsampled materials.

All seed, fruit, and underground parts, including unburnt contaminants, were removed from the sorted portions of samples. Segregated constituents, mostly burnt seed and fruit residues, were stored in translucent, hard plastic centrifuge tubes with acid-free paper tags denoting site trinomial, sample number, size grade, and a code for constituent type. All items of a single type or taxon were stored (in separate centrifuge tubes for each provenience and size grade) in 4-mil plastic bags with acid-free paper labels. All labels were inscribed with no. 2 pencil.

RESULTS

Charred plant remains were recovered from field screens and from flotation samples. Plant remains from field screens (Table 2), which are biased towards recovery of the largest kinds of plant remains, do not constitute a representative sample of the full range of plant remains. The principal value of field screen specimens is that they are recovered from a much larger volume of deposit than can be effectively flotation-processed, and hence rare large items can often be found that escape recovery in flotation samples.

No taxa were recovered in field screens that were not also found in flotation samples at Los Vaqueros sites. But large pine nut specimens found appear not to be gray pine (*Pinus sabiniana*) remains typical of foothill localities throughout central California. The morphology of the field screen specimens suggests that these instead are Coulter pine (*Pinus coulteri*). Coulter pine reaches its northern limits on the eastern flanks of Mt. Diablo, where it is interspersed with gray pine stands. There is little difference in the characteristics of these trees that concern human use, such as seasonal availability, growth habitat, and distribution in the Los Vaqueros Project vicinity. Because smaller pine nutshell fragments found in flotation samples cannot be identified to species, they will be referred to in the text as *Pinus* sp. and as pine nuts.

The most meaningful samples of the range of plant remains, of course, were recovered from flotation samples. A distinction is made between large seeds, fragmented inedible waste of nutshell and berry pits, and small seeds that are digestible, usually whole or nearly whole specimens. A total of 3,434 large seed fragments were identified to 7 genera from the project sites, along with 2,709 small seeds identified to plant family; of the latter 1,132 of the small seeds could be identified to 29 different genera. Also identified were bulbs of the *Brodiaea* taxonomic group. Density per liter of sediment of large and small seed remains is presented in Tables 3-12. Information on aboriginal uses and botanical attributes of identified plant taxa is presented in Table 13.

A total of 11 samples, comprising 171.7 liters of sediment, processed from early Holocene CCO-696 Deep yielded very low densities of plant remains; only six large and six small seed genera were identified (Tables 3 and 4). Sampling at CCO-637 also yielded a spare assemblage (Tables 5 and 6), as flotation of ten samples (231.9 liters of sediment) produced only six large seed and seven small seed genera. A total of 17 samples (266.3 liters of sediment) collected at CCO-696 West yielded seven large seed and 20 small seed genera (Tables 7 and 8). The eight samples (230.8 liters of sediment) processed from CCO-459 also produced 7 large seed and 20 small seed genera (Tables 9 and 10), while the eight samples (54.5 liters of sediment) analyzed from CCO-458 produced 7 large seed and 26 small seed genera (Tables 11 and 12).

Of additional interest at CCO-459 is the distinction between feature and non-feature deposits. Acorn, bay, and three small-seeded genera are more common outside of features, while manzanita and several small-seeded genera are more common in features. This is in contrast to CCO-458, where acorn, bay, and several small taxa were much more common in features than in midden deposits. No taxa were found in obviously higher frequencies in midden than features at CCO-458. No other salient distinction between feature and non-feature contexts was found in the other three site components.

Table 1. Subsampling Fractions for Light Fraction Size Grades (Percent)

	2 mm		1 mm		0.7 mm	
	Large Seed	Small Seed	Large Seed	Small Seed	Large Seed	Small Seed
CCO-696 Deep (no subsampling)						
CCO-637 (subsampled 6 of 10 samples)						
54*	--	--	--	--	50	--
56	--	--	--	--	25	--
58	--	--	50	--	12.5	25
59	--	--	--	--	25	25
62	--	--	--	--	50	--
63	--	--	--	--	50	--
CCO-696 West (subsampled 9 of 17 samples)						
68	--	--	--	--	50	50
71	--	--	--	--	50	--
74	--	--	50	--	6.25	--
77	--	--	--	--	25	--
78	--	--	--	--	50	--
79	--	--	--	--	50	--
90	--	--	--	--	66	--
91	--	--	--	--	50	--
100	--	--	--	--	25	--
CCO-459						
36	50	50	12.5	12.5	6.25	6.25
38	--	--	50	50	12.5	12.5
44	--	--	--	--	--	--
46	--	--	50	50	6.25	6.25
48	--	--	25	25	12.5	12.5
49	--	--	25	25	12.5	12.5
50	12.5	12.5	12.5	12.5	6.25	6.25
51	25	25	25	25	25	25
CCO-458						
4	--	--	50	50	25	25
7	--	--	12.5	12.5	6.25	6.25
10	50	--	25	25	12.5	12.5
13	--	--	50	50	12.5	12.5
19	--	--	--	--	25	25
24	--	--	--	--	25	25
25	--	--	--	--	25	25
29	--	--	--	--	25	25

* Sample number.

Table 2. Plant Remains from Field Screens

Catalog Number	Unit	Depth (cm)	Burnt/ Unburnt	Description	Number of items
CCO-458					
135	N122/W106	0-10	U	safflower?	1
263	N124/W107	30-40	B	gray pine	11 (1)
366	same	10-20	U	manzanita	1
439	N122/W108	10-20	U	safflower?	1
440	same	same	B	manzanita	1
740	N122/W110	50-60	B	gray pine	1
800	N122/W107	10-20	B	manzanita	1
884	N126/W106	20-30	B	manzanita	1
940	same	40-50	B	manzanita	1
				gray pine	1
1005	N124/W105	0-10	U	safflower?	1
1116	same	50-60	B	*Brodiaea* bulb?	many (1)
1292	N124/W109	20-30	U	bay nutshell	1
1433	N126/W103	30-40	B	acorn kernel (live oak?)	1
1466	same	50-60	B	manzanita	1
1552	N122/W104	30-40	B	manzanita	1
1664	N126/W108	0-10	U	safflower?	2
1741	same	40-50	B	manzanita	2
1769	same	50-60	B	acorn kernel	1
			U?	slag??	1
1793	same	60-70	B	manzanita	2
1794	same	same	U	safflower?	1
1795	same	same	B	soaproot fragment?	1
			B	bone	1
2270	N126/W110	30-40	B	manzanita	1
2281	same	40-50	B	gray pine	1
2326	same	70-80	B	manzanita	1
2344	same	80-90	B	manzanita	1
2419	same	140-150	B	gray pine	1
2540	N126/W103	0-10	B	wheat kernel	1
2542	N126/W103	10-20	U	safflower?	1
2543	N126/W104	0-10	B	manzanita	1
2547	N126/W103	20-30	B	manzanita	1
2549	N126/W103	30-40	B	manzanita	2
			B	gray pine	1
None	N126/W106	50-60	U	safflower?	1

Table 2. Plant Remains from Field Screens continued

Catalog Number	Unit	Depth (cm)	Burnt/ Unburnt	Description	Number of items
	CCo-459				
95-3-182	Feature 3	---	B	soaproot fragment?	1
	CCo-636				
None	Float 32, 1/8"				
	Feature 1	30-70	B	manzanita	4
			U	slag?	1
	same, 1/16"		B	manzanita	15
			B	acorn nutshell	2
			B	wood charcoal	25
	CCo-637				
None	Float 54, 1/8"	90			
	Burial 1		B	manzanita	1
	CCo-696				
95-8-601	Exp 1, Feat 12,				
	South/Central	---	B	manzanita	1
95-8-1446	M5S	20-30	U	safflower?	1
95-8-1586	M15S	80-90	B	manzanita	1
95-8-1626	M20S	50-60	B	manzanita	1
95-8-1987	Burial 143				
	matrix	---	B	manzanita	1
95-8-2046	Burial 117				
	matrix	---	B	manzanita	1

Table 3. CCO-696 Deep Large Taxa Density per Liter of Sediment

Sample Number		131	97	98	99	123	124	125	126	127	128	129
Ending Depth (cm)		?	?	?	?	350	360	370	380	390	400	410
Sample Volume (liters)		13.0	14.0	13.8	17.0	16.3	16.0	15.8	16.0	17.5	15.0	17.3
TAXON	COMMON NAME											
Quercus sp.	Oak acorn											
#		--	1.5	1.4	--	0.18	0.25	0.25	0.38	0.63	0.60	0.29
mg		--	0.24	0.28	--	0.04	0.06	0.08	0.23	0.14	0.12	0.07
Arctostaphylos sp.	Manzanita											
#		--	0.07	--	--	--	0.13	0.13	--	0.06	--	0.06
mg		--	0.01	--	--	--	0.06	0.02	--	0.11	--	0.02
Marah sp.	Wild cucumber											
#		--	0.07	0.07	0.06	0.06	--	--	--	0.29	0.40	0.92
mg		--	0.01	0.06	0.01	0.01	--	--	--	0.07	0.13	0.63
Umbellularia californica	Bay											
#		--	--	--	0.06	--	--	--	--	--	--	--
mg		--	--	--	0.01	--	--	--	--	--	--	--
Aesculus californica	Buckeye											
#		--	--	0.22	--	--	--	--	--	--	--	--
mg		--	--	0.04	--	--	--	--	--	--	--	--
Clarkia sp. capsule												
#	Farewell to spring	--	--	--	--	--	--	--	--	--	0.07	--
mg		--	--	--	--	--	--	--	--	--	0.02	--
Total												
#		--	1.6	1.7	0.12	0.25	0.38	0.38	0.38	0.97	1.07	1.27
mg		--	0.26	0.38	0.02	0.04	0.12	0.09	0.23	0.32	0.27	0.72
Wood charcoal (sorted to 1 mm grade)												
g		Trace	0.002	0.007	0.022	0.009	0.025	0.013	0.006	0.006	0.003	0.003

Table 4. CCO-696 Deep Small Taxa Density per Liter of Sediment

Sample Number		131	97	98	99	123	124	125	126	127	128	129
Ending Depth (cm)		?	?	?	?	350	360	370	380	390	400	410
Sample Volume (liters)		13.0	14.0	13.8	17.0	16.3	16.0	15.8	16.0	17.5	15.0	17.3
TAXON	COMMON NAME											
Amsinckia sp.	Fiddleneck	--	--	--	0.06	--	--	--	--	--	--	--
Clarkia sp.	Farewell to spring	--	--	--	--	--	--	--	0.06	--	--	--
Claytonia sp.	Miners lettuce	--	--	--	--	0.06	--	--	0.06	--	--	--
Galium sp.	Bedstraw	--	--	--	--	--	0.06	--	--	--	--	--
Madia sp.	Tarweed	--	--	0.07	--	--	--	--	--	--	--	--
Vulpia/Festuca	Fescue grass	--	0.07	--	--	--	--	--	--	--	--	--
FAMILY												
Asteraceae	Sunflower	--	--	--	0.24	--	--	--	--	--	--	--
Fabaceae	Bean	--	--	--	--	--	--	--	0.13	0.06	0.13	--
Poaceae fragments	Grass	--	0.07	--	0.12	--	0.06	0.13	--	--	--	--
Unidentified seeds		--	0.14	0.07	0.24	0.06	0.13	--	0.06	0.06	0.13	--
Unidentified seed fragments		--	0.43	0.29	0.35	--	0.06	0.38	0.19	0.11	0.13	--
Total Identified*		--	0.14	0.07	0.41	0.06	0.13	0.13	0.25	0.06	0.13	--
Total		--	0.71	0.43	1.0	0.12	0.31	0.51	0.50	0.23	0.40	--

* Genus or family

Table 5. CCO-637 Large Taxa Density per Liter of Sediment

Sample Number		53	54	55	56	57	58	59	60	62	63	64
Feature/Burial Designation		1	Burial 1	Burial 1	--	--	2	--	5	3	4	Off-site
Sample Volume (liters)		30.0	38.0	9.0	33.5	10.6	36.7	30.8	14.0	12.8	16.5	12.0
TAXON	COMMON NAME											
Quercus sp.	Oak acorn											
#		1.07	3.6	6.2	4.2	0.85	4.6	8.8	7.1	3.1	4.9	0.08
mg		0.25	1.1	3.6	1.4	0.20	1.7	3.5	3.2	0.98	1.3	0.01
Arctostaphylos sp.	Manzanita nutlets											
#		0.40	1.3	1.9	3.6	0.66	4.7	6.1	1.9	2.9	4.1	0.17
mg		0.74	1.3	3.9	2.8	0.79	4.7	4.3	1.4	1.9	2.6	0.37
Marah sp.	Wild cucumber											
#		0.13	0.31	1.22	0.18	0.19	0.63	0.58	0.14	1.6	1.2	--
mg		0.04	0.74	0.97	0.12	0.04	0.60	0.29	0.12	0.86	0.63	--
Umbellularia californica	Bay											
#		0.13	1.6	1.1	0.54	0.19	0.44	2.4	1.2	1.5	1.8	--
mg		0.05	0.48	0.40	0.38	0.06	0.28	0.96	0.66	0.48	0.48	--
Aesculus californica	Buckeye											
#		--	0.11	--	0.06	0.28	0.05	0.13	1.07	--	0.36	--
mg		--	0.31	--	0.03	0.09	0.08	0.13	0.38	--	0.08	--
Pinus sp.	Coulter or Gray pine											
#		0.03	0.21	0.11	0.24	--	0.16	0.13	0.29	--	0.24	--
mg		0.11	0.30	0.24	0.81	--	0.27	0.90	xx	--	0.62	--
Total												
#		1.8	7.1	10.6	8.8	2.2	10.6	18.2	11.6	9.1	12.6	0.25
mg		1.19	4.23	9.11	5.54	1.18	7.63	10.08	xx	4.22	5.71	0.38
Quercus sp. attachment disks												
#		--	--	--	--	0.09	--	--	--	--	0.06	--
Wood charcoal (sorted to 1 mm grade)												
gm		0.037	0.008	0.033	0.009	0.009	0.049	0.032	0.114	0.023	0.030	0.002

Table 6. CCO-637 Small Taxa Density per Liter of Sediment

Sample Number		53	54	55	56	57	58	59	60	62	63	64
Feature/Burial Designation		1	Burial 1	Burial 1	--	--	2	--	5	3	4	Off-site
Sample Volume (liters)		30.0	38.0	9.0	33.5	10.6	36.7	30.8	14.0	12.8	16.5	12.0
TAXON	COMMON NAME											
Amsinckia sp.	Fiddleneck	--	0.08	--	--	--	0.03	0.13	--	--	--	--
Calandrinia sp.	Red maids	0.03	0.03	--	--	--	--	--	--	--	--	--
Chenopodium sp.	Goosefoot	0.03	0.03	--	--	--	--	0.26	--	--	0.06	--
Clarkia sp.	Farewell to spring	0.03	0.03	--	--	--	--	--	--	--	0.12	--
Deschampsia sp.	Hairgrass	--	0.05	0.11	--	--	--	--	+	--	--	--
Phalaris sp.	Maygrass	0.07	--	--	--	--	--	--	--	--	--	--
Vulpia/Festuca	Fescue grass	--	0.03	0.11	--	--	--	--	+	--	--	--
FAMILY												
Asteraceae	Sunflower	0.03	--	0.11	--	--	--	--	+	--	--	--
Fabaceae	Bean	--	0.03	--	--	--	--	0.26	--	--	--	--
Poaceae fragments	Grass	0.16	0.18	0.11	--	--	0.11	0.03	--	--	0.42	0.16
Unidentified seeds		--	0.03	0.11	--	--	--	--	--	--	--	--
Unidentified seed fragments		0.20	0.42	0.55	0.12	--	0.08	0.55	+	0.08	0.48	--
Total Identified*		0.35	0.44	0.44	--	--	0.14	0.68	??	--	0.60	0.16
Total		0.55	0.99	1.10	0.12	--	0.22	1.23	??	0.08	1.08	0.16

* Genus or family

Table 7. CCO-696 West Large Taxa Density per Liter of Sediment

Sample Number		68	69	71	73	74	75	76	77	78	79	80	81	86	89	90	91	100
Feature Designation		1	2	4	6	7	10	12	16	15	17	19	22	Bur. 139	Col. 3	Col. 4	Col. 5	13
Sample Volume		16.7	12.5	15.5	11.5	26.5	13.5	12.2	29.0	24.3	9.0	18.8	9.3	14.0	10.0	18.5	13.0	12.0
TAXON	COMMON NAME																	
Quercus sp.	Oak acorn																	
#		3.4	0.56	0.71	4.1	18.6	1.3	2.4	8.2	6.4	27.7	8.9	3.2	4.2	2.2	6.9	9.6	20.8
mg		1.1	0.09	0.17	0.87	7.0	0.30	0.84	2.1	1.9	3.9	2.4	0.70	1.4	0.9	2.0	2.4	4.4
Arctostaphylos sp.	Manzanita nutlets																	
#		0.84	0.08	0.58	4.7	27.7	0.37	3.6	2.4	1.3	4.9	1.9	4.1	0.36	0.90	1.7	6.8	11.8
mg		0.63	0.06	0.28	3.5	17.8	2.4	4.7	1.3	1.0	4.0	2.2	3.7	0.33	0.37	2.4	7.8	7.1
Marah sp.	Wild cucumber																	
#		--	--	--	0.09	--	--	0.25	--	--	--	0.11	0.20	0.14	--	0.05	0.38	2.2
mg		--	--	--	0.03	--	--	0.39	--	--	--	0.03	0.12	0.06	--	0.06	0.20	0.69
Umbellularia californica	Bay																	
#		0.60	0.72	0.77	0.78	5.4	0.07	1.4	2.6	0.78	2.4	1.1	1.8	0.86	0.40	1.3	0.77	5.6
mg		0.35	0.22	0.21	0.30	2.6	0.01	0.77	0.65	0.26	0.58	0.63	0.73	0.41	0.09	0.65	1.2	1.6
Aesculus californica	Buckeye																	
#		--	0.08	0.19	0.78	8.7	--	0.90	2.6	0.41	1.6	0.05	2.7	0.86	0.10	1.6	1.3	1.7
mg		--	0.03	0.18	0.44	5.4	--	0.42	0.93	0.20	0.43	0.09	1.6	0.42	0.06	0.47	1.4	0.59
Pinus sp.	Coulter or Gray pine																	
#		--	--	--	--	--	--	--	--	--	0.33	--	--	0.14	0.10	--	--	--
mg		--	--	--	--	--	--	--	--	--	0.44	--	--	0.42	0.11	--	--	--
Clarkia sp. capsule	Farewell to spring																	
#		--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.16	0.08	0.33
mg		--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.04	0.02	0.07
Total																		
#		4.84	1.44	2.25	10.45	60.40	1.74	8.55	15.80	8.89	36.93	12.15	12.00	6.56	3.70	11.71	21.33	46.43
mg		2.08	0.40	0.84	5.14	32.80	2.71	7.12	4.98	3.36	9.35	5.35	6.85	3.04	1.53	5.62	13.02	14.45
Brodiaea/ Dichelostemma sp.	Brodiaea bulbs	--	--	--	--	--	--	--	0.03	--	--	--	--	--	--	--	--	--
Quercus sp. attachment disks		--	--	--	--	0.08	--	--	0.07	0.04	0.22	0.05	--	0.07	--	--	--	0.16
Quercus sp. kernel fragments		--	--	--	--	0.04	--	--	--	--	--	--	--	--	--	--	--	--
Wood charcoal (sorted to 1 mm grade) gm		0.012	0.004	0.003	0.009	0.151	1.407	0.020	0.041	0.037	0.033	0.037	0.011	0.857	0.040	0.054	0.031	0. 0 5 0

Note: Bur. = burial; Col. = column.

Table 8. CCO-696 West Small Taxa Density per Liter of Sediment

Sample Number		68	69	71	73	74	75	76	77	78	79	80	81	86	89	90	91	100
Feature Designation		1	2	4	6	7	10	12	16	15	17	19	22	Bur. 139	Col. 3	Col. 4	Col. 5	13
Sample Volume		16.7	12.5	15.5	11.5	26.5	13.5	12.2	29.0	24.3	9.0	18.8	9.3	14.0	10.0	18.5	13.0	12.0
TAXON	COMMON NAME																	
cf. *Amsinckia* sp.	Fiddleneck	--	--	--	--	0.19	--	--	--	0.04	0.11	0.16	--	--	--	0.11	0.08	--
Bromus sp.	Brome grass	--	--	--	--	--	--	--	--	--	--	0.05	--	--	--	--	--	--
Calandrinia sp.	Red maids	--	--	--	--	--	--	--	--	--	--	--	--	0.07	--	--	--	0.17
Chenopodium sp.	Goosefoot	0.12	--	--	--	0.11	--	--	0.17	--	--	0.11	0.11	0.07	--	0.16	--	0.33
Clarkia sp.	Farewell to spring	0.12	0.08	0.13	--	0.23	--	0.16	0.03	0.04	0.11	0.11	--	0.07	0.10	0.81	0.15	0.17
Claytonia sp.	Miners lettuce	--	--	--	--	--	--	--	--	--	0.11	--	0.11	--	--	--	--	--
Deschampsia sp.	Hairgrass	--	--	--	--	--	--	--	0.07	--	0.11	--	--	--	--	--	--	--
Erodium sp.	Filaree*	--	--	--	--	--	--	--	--	--	--	--	--	0.07	--	--	--	--
Galium sp.	Bedstraw	--	--	--	--	--	0.15	--	0.03	--	--	--	--	--	0.10	--	--	--
Lepidium sp.	Peppergrass	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.08	0.08
Madia sp.	Tarweed	--	--	--	--	--	--	--	--	--	0.11	--	--	--	--	--	--	0.08
Phacelia sp.	Phacelia	--	--	--	--	--	--	--	--	--	0.22	--	--	0.43	0.20	0.05	--	--
Phalaris sp.	Maygrass	--	--	--	--	--	0.07	--	--	0.04	0.11	--	0.11	--	0.10	--	0.08	0.08
Polygonum sp.	Knotweed	--	--	--	--	0.04	--	--	--	--	--	--	--	--	--	--	--	--
cf. *Potamogeton* sp.	Pondweed	--	--	--	--	0.04	--	--	--	--	--	--	--	--	--	--	--	--
Ranunculus sp.	Buttercup	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	--	--
Salvia sp.	Sage	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--	0.08	--
Scirpus sp.	Tule	--	--	--	--	--	--	--	--	--	--	--	--	0.07	--	--	--	--
Vulpia/Festuca	Fescue grass	--	--	--	--	--	--	--	0.03	--	--	--	--	0.21	0.20	0.05	0.08	0.17
Asteraceae A		--	--	--	--	--	--	--	--	--	0.11	--	--	--	--	0.11	--	0.08
Unknown A		--	--	--	--	--	0.89	--	--	--	0.55	--	--	--	0.10	--	--	--
FAMILY																		
Apiaceae	Carrot	--	--	--	--	0.04	--	--	--	--	--	--	--	--	--	--	--	--
Asteraceae	Sunflower	--	--	--	--	0.04	--	--	0.03	--	--	0.05	--	--	--	--	0.15	0.08
Cyperaceae	Sedge	--	--	--	--	--	0.07	--	0.03	--	--	0.05	--	--	--	--	--	--
Fabaceae	Bean	--	--	--	--	0.23	0.22	--	--	--	--	--	--	0.29	--	0.27	0.08	0.25
Papaveraceae	Poppy	--	--	--	--	--	0.30	--	--	--	--	--	--	--	0.20	--	--	--
Poaceae fragments	Grass	0.36	--	--	--	0.15	1.56	0.16	0.31	0.04	1.22	0.27	0.11	0.29	1.9	0.22	0.62	0.67
Unidentified seeds		0.12	--	--	--	0.15	0.67	0.16	0.10	--	0.11	0.32	0.11	1.3	0.10	--	0.08	0.25
Unidentified seed fragments		0.12	0.16	--	0.09	0.56	0.52	0.16	0.17	0.12	0.77	0.37	--	0.43	2.1	0.70	0.31	1.2
Total Identified**		0.60	0.08	0.13	--	1.07	3.26	0.32	0.70	0.16	2.76	0.80	0.44	1.64	3.10	1.78	1.40	2.16
Total		0.84	0.24	0.13	0.09	1.78	4.45	0.64	0.97	0.28	3.64	1.49	0.55	3.37	5.30	2.48	1.79	4.58

* Introduced taxon.   ** Genus or family; does not include filaree. Note: Bur. = burial; Col. = column.

Table 9. CCO-459 Large Taxa Density per Liter of Sediment

Sample Number		36	38	44	46	48	49	50	51	Nonfeature Samples		Feature Samples		All Samples	
Unit		S1/E0	S1/E0	Strat A	Strat A	S2-3/W0	N0/W0	S0-2/E5	S4/W0						
Feature Number						1	2	3	4						
Depth (cm)		30-40	50-60	20-30	40-50	71-94	140-162	58-69	50-120						
Sample Volume		22.8	17.2	7.0	6.3	39.5	33.6	58.7	33.0	mean	s.d.	mean	s.d.	mean	s.d.
TAXON	COMMON NAME														
Quercus sp.	Oak acorn														
#		40.4	19.9	2.1	75.2	13.2	4.0	17.7	5.3	34.4	31.4	10.0	6.5	22.2	24.7
mg		10.0	5.1	0.30	20.5	2.7	1.0	5.0	1.7	9.0	8.6	2.6	1.7	5.8	6.7
Arctostaphylos sp.	Manzanita														
#		0.04	0.35	--	0.79	1.5	--	0.14	0.36	0.30	0.37	0.50	0.68	0.40	0.52
mg		0.25	1.0	--	2.1	3.2	--	3.7	6.4	0.84	0.94	3.3	2.6	2.1	2.3
Marah sp.	Wild cucumber														
#		--	0.47	0.29	0.32	0.41	0.03	--	0.12	0.27	0.20	0.14	0.19	0.21	0.19
mg		--	1.1	0.03	0.41	0.20	0.06	--	0.21	0.39	0.51	0.12	0.10	0.25	0.37
Umbellularia californica	Bay														
#		2.1	0.12	0.15	--	--	--	0.14	--	0.59	1.01	0.04	0.07	0.31	0.72
mg		0.77	0.07	0.03	--	--	--	0.03	--	0.22	0.37	0.01	0.02	0.11	0.27
Aesculus californica	Buckeye														
#		0.70	0.17	--	--	--	0.36	--	0.12	0.22	0.33	0.12	0.17	0.17	0.25
mg		0.14	0.10	--	--	--	0.18	--	0.07	0.06	0.07	0.06	0.09	0.06	0.07
Pinus sp.	Coulter or Gray pine														
#		0.70	--	--	0.32	--	--	0.14	0.12	0.26	0.33	0.07	0.08	0.16	0.25
mg		0.56	--	--	0.06	--	--	0.14	0.33	0.16	0.27	0.12	0.16	0.14	0.21
Clarkia sp. capsule	Farewell to spring														
#		--	--	0.29	--	--	--	--	--	0.07	0.15	--	--	0.04	0.10
mg		--	--	0.01	--	--	--	--	--	0.002	0.005	--	--	0.001	0.004
Total															
#		43.9	21.0	2.8	76.6	15.1	4.4	18.1	6.0	36.1	31.8	10.9	6.7	23.5	25.2
mg		11.7	7.4	0.37	23.1	6.1	1.2	8.9	8.7	10.6	9.5	6.2	3.6	8.4	7.1
Brodiaea/ *Dichelostemma* sp.	Brodiaea bulbs	--	--	--	0.16	0.03	0.03	0.27	--	0.04	0.08	0.08	0.13	0.06	0.10
Quercus sp. attachment disks		0.04	--	--	--	0.03	--	--	--	0.01	0.02	0.01	0.02	0.01	0.02
Wood charcoal (sorted to 1 mm grade)															
gm		3.46	2.09	0.10	2.86	0.99	1.37	3.75	1.67	2.99	2.60	1.95	1.24	2.47	1.97

s.d. = standard deviation.

Table 10. CCO-459 Small Taxa Density per Liter of Sediment

Sample Number		36	38	44	46	48	49	50	51	Nonfeature Samples		Feature Samples		All Samples	
Unit		S1/E0	S1/E0	Strat A	Strat A	S2-3/W0	N0/W0	S0-2/E5	S4/W0						
Feature Number						1	2	3	4						
Depth (cm)		30-40	50-60	20-30	40-50	71-94	140-162	58-69	50-120						
Sample Volume		22.8	17.2	7.0	6.3	39.5	33.6	58.7	33.0	mean	s.d.	mean	s.d.	mean	s.d.
TAXON	COMMON NAME														
Achyrachaena mollis	Blow wives	1.4	--	--	--	--	--	--	--	0.35	0.70	--	--	0.02	0.49
cf. *Amsinckia* sp.	Fiddleneck	2.1	0.93	--	3.2	--	0.24	0.55	0.36	1.6	1.4	0.29	0.23	0.92	1.1
Bromus sp.	Brome grass	1.4	--	--	0.32	0.41	--	0.82	0.12	0.43	0.66	0.34	0.36	0.38	0.50
Calandrinia sp.	Red maids	2.8	0.58	--	7.6	0.81	2.1	10.6	2.4	2.7	3.5	4.0	4.5	3.4	3.8
Chenopodium sp.	Goosefoot	0.70	0.12	--	--	--	--	0.55	0.61	0.21	0.33	0.29	0.34	0.25	0.31
Claytonia sp.	Miners lettuce	2.1	0.47	--	--	0.20	--	--	0.12	0.64	1.00	0.08	0.10	0.36	0.72
Deschampsia sp.	Hairgrass	4.9	1.1	--	5.7	4.7	0.71	1.9	0.61	2.9	2.8	2.0	1.9	2.5	2.3
Erodium sp.*	Filaree	--	--	--	--	--	--	--	0.02	--	--	0.005	0.01	0.002	0.007
Galium sp.	Bedstraw	--	0.17	0.14	--	0.30	0.24	--	0.12	0.08	0.09	0.17	0.13	0.12	0.12
Helianthus sp.	Sunflower	0.04	--	--	--	--	--	--	0.24	0.01	0.02	0.06	0.12	0.04	0.08
Juncus sp.	Rush	0.70	--	--	--	0.10	--	0.27	--	0.18	0.35	0.09	0.13	0.13	0.25
Lepidium sp.	Peppergrass	0.70	0.47	0.14	2.9	0.20	0.12	1.9	1.1	1.1	2.8	0.83	0.84	0.94	0.99
Madia sp.	Tarweed	--	--	--	--	0.30	0.24	0.14	1.2	--	--	0.47	0.49	0.24	0.41
Phacelia sp.	Wild heliotrope	1.4	0.12	--	--	--	0.12	0.14	0.36	0.38	0.68	0.16	0.15	0.27	0.47
Phalaris sp.	Maygrass	2.5	1.1	--	0.63	1.2	0.12	3.9	0.61	1.1	1.1	1.5	1.7	1.3	1.3
cf. *Plantago* sp.	Plantain	1.8	0.47	--	0.32	0.13	0.24	0.70	--	0.60	0.80	0.31	0.31	0.46	0.59
Poa sp.	Bluegrass	--	--	--	--	0.41	--	0.27	--	--	--	0.17	0.20	0.09	0.16
Salvia sp.	Sage	0.70	--	--	--	0.10	--	--	0.48	0.18	0.35	0.15	0.23	0.16	0.27
Vulpia/Festuca	Fescue grass	0.70	--	--	10.2	2.7	16.7	2.2	1.6	2.7	5.0	5.8	7.3	4.3	6.0
Asteraceae A		6.3	0.93	0.29	10.5	0.86	1.2	10.1	4.1	4.5	4.8	4.1	4.3	4.3	4.2
FAMILY															
Apiaceae	Parsley	--	--	--	--	--	--	--	0.12	--	--	0.03	0.06	0.02	0.04
Asteraceae	Sunflower	2.1	1.1	0.29	0.95	2.5	0.48	8.2	2.1	1.1	0.75	3.3	3.4	2.2	2.5
Cyperaceae	Sedge	--	--	--	--	--	--	--	0.03	--	--	0.01	0.02	0.004	0.01
Fabaceae	Bean	2.1	0.70	--	0.32	0.63	2.1	1.6	0.85	0.78	0.93	1.3	0.68	1.0	0.80
Papaveraceae	Poppy	--	--	--	--	--	0.24	--	--	--	--	0.06	0.12	0.03	0.08
Poaceae	Grass														
Unidentified		0.04	--	--	--	0.03	--	0.55	0.48	0.01	0.02	0.27	0.29	0.14	0.23
Fragments		11.8	11.7	0.14	15.6	5.4	0.36	18.7	7.6	9.8	6.7	8.0	7.7	8.9	6.8
Unidentified embryos		1.4	--	--	--	--	2.0	5.6	1.1	0.35	0.70	2.2	2.4	1.3	1.9
Unidentified seeds		0.70	1.22	--	0.63	1.1	0.71	2.0	2.2	0.64	0.50	1.5	0.7	1.1	0.73
Unidentified seed fragments		34.0	6.8	0.86	33.0	8.5	3.1	7.6	9.6	18.7	17.3	7.2	2.9	12.9	13.0
Total Identified to genus		30.2	6.0	0.57	41.4	12.4	21.9	34.0	14.1	19.5	19.4	20.6	9.9	20.1	14.3
Total Identified to family		46.3	19.5	1.0	58.2	21.0	25.1	63.1	31.3	25.9	28.2	32.4	21.3	32.4	21.3
Total		82.5	15.8	1.9	91.9	30.6	30.9	78.3	38.1	48.0	45.7	44.5	22.8	46.2	33.5

* Introduced taxon. s.d. = standard deviation.

Table 11. CCO-458 Large Taxa Density per Liter of Sediment

Sample Number		4	7	10	13	19	24	25	29	Nonfeature Samples		Feature Samples		All Samples	
Unit		N120/ W107	N124/ W105	N124/ W105	N124/ W105	N126/ W108	N124/ W109	N122/ W106	N122/ W110						
Feature Number						1	8	10	9						
Depth (cm)		30-40	20-30	50-60	70-80	60-90	36-56	30-40	30-50						
Sample Volume (liters)		12.0	10.6	9.0	8.5	6.2	2.4	2.9	2.9	mean	s.d	mean	s.d	mean	s.d.
TAXON	COMMON NAME														
Quercus sp.	Oak acorn														
#		50.8	116.5	84.7	61.9	67.9	230.4	316.9	71.4	78.5	29.0	171.7	123.0	125.1	96.5
mg		17.2	42.4	44.9	19.0	23.4	67.0	88.5	25.7	30.9	14.8	51.2	32.0	41.0	25.5
Arctostaphylos sp.	Manzanita nutlets														
#		1.3	0.38	0.89	0.24	1.5	7.1	--	0.34	0.70	0.49	2.2	3.3	1.5	2.3
mg		2.0	12.2	6.2	0.31	8.8	7.3	--	18.4	5.2	5.3	8.6	7.6	6.9	6.3
Marah sp.	Wild cucumber														
#		0.92	0.09	--	0.12	--	--	1.7	0.69	0.28	0.43	0.60	0.80	0.44	0.62
mg		0.63	0.23	--	0.93	--	--	0.41	4.5	0.45	0.41	1.2	2.2	0.82	1.52
Umbellularia californica	Bay														
#		15.1	32.5	23.6	7.1	10.0	74.6	107.9	19.3	19.6	10.9	53.0	46.4	36.3	36.0
mg		9.0	15.8	10.8	5.8	5.9	34.5	38.1	13.5	10.4	4.2	23.0	15.7	16.7	12.6
Aesculus californica	Buckeye														
#		1.8	3.3	3.8	1.1	1.1	8.3	11.0	1.7	2.5	1.3	5.5	4.9	4.0	3.7
mg		0.85	0.93	1.6	0.12	1.0	3.5	5.7	0.66	0.88	0.61	2.7	2.4	1.8	1.9
Pinus sp.	Coulter or Gray pine														
#		--	--	--	--	0.16	2.9	--	--	--	--	0.77	1.42	0.38	1.02
mg		--	--	--	--	0.72	3.5	--	--	--	--	1.1	1.7	0.53	1.23
Clarkia sp. capsule	Farewell to spring														
#		--	1.7	0.89	0.47	10.8	1.7	2.8	1.7	0.77	0.72	4.3	4.4	2.5	3.5
mg		--	2.1	0.27	0.19	2.0	0.50	0.55	0.59	0.64	0.98	0.91	0.73	0.89	0.75
Vitis californica	Wild grape														
#		--	--	--	--	--	--	1.4	--	--	--	0.35	0.70	0.18	0.49
mg		--	--	--	--	--	--	0.14	--	--	--	0.04	0.07	0.02	0.05
Total															
#		69.9	154.5	113.9	70.8	91.5	325.0	441.7	95.1	102.3	40.4	238.3	174.1	170.3	137.8
mg		29.7	73.7	63.8	26.4	41.8	116.3	133.4	63.4	48.4	23.9	88.7	43.2	68.6	38.8
Quercus sp. attachment disks		--	0.19	0.11	--	--	--	--	--	0.08	0.09	--	--	0.04	0.07
Quercus sp. kernels		--	--	0.33	--	--	--	--	--						
Wood charcoal (sorted to 1 mm grade)															
gm		1.42	1.79	1.56	1.26	3.23	3.54	3.97	2.41	1.51	0.22	3.29	0.66	2.40	1.05

s.d. = standard deviation.

Table 12. CCO-458 Small Taxa Density per Liter of Sediment

Sample Number		4	7	10	13	19	24	25	29	Nonfeature Samples		Feature Samples		All Samples	
Unit		N120/ W107	N124/ W105	N124/ W105	N124/ W105	N126/ W108	N124/ W109	N122/ W106	N122/ W110						
Feature Number						1	8	10	9						
Depth (cm)		30-40	20-30	50-60	70-80	60-90	36-56	30-40	30-50						
Sample Volume (liters)		12.0	10.6	9.0	8.5	6.2	2.4	2.9	2.9	mean	s.d	mean	s.d	mean	s.d.
TAXON	COMMON NAME														
Achyrachaena mollis	Blow wives	--	--	3.6	0.23	0.32	0.42	1.7	1.4	0.96	1.8	0.96	0.69	1.2	1.3
cf. *Amsinckia* sp.	Fiddleneck	0.50	4.5	0.89	1.5	1.9	5.0	1.0	5.2	1.8	1.8	3.3	2.1	2.6	2.0
Atriplex sp.	Saltbush	--	--	0.89	0.12	--	--	5.9	--	0.25	0.43	1.5	3.0	0.86	2.1
Bromus sp.	Brome Grass	0.75	3.8	7.1	0.23	1.9	2.5	4.5	0.34	3.0	3.2	2.3	1.7	2.6	2.4
Calandrinia sp.	Red maids	3.5	3.4	10.7	2.1	21.6	24.6	2.8	7.9	4.9	3.9	14.2	10.5	9.6	8.9
Chenopodium sp.	Goosefoot	4.5	--	0.89	2.8	2.6	18.8	4.1	3.4	2.0	2.0	7.2	7.7	4.6	5.9
Clarkia sp.	Farewell to spring	2.0	1.5	--	0.23	9.7	5.0	5.5	8.2	0.93	0.97	7.1	2.2	4.0	3.7
Claytonia sp.	Miners lettuce	2.3	--	--	1.9	--	--	1.4	10.0	1.1	1.2	2.9	4.8	2.0	3.4
Deschampsia sp.	Hairgrass	3.0	12.1	5.3	5.9	12.9	16.7	24.8	9.7	6.6	3.9	16.0	6.5	11.3	7.0
Galium sp.	Bedstraw	--	--	--	0.47	--	0.83	--	--	0.12	0.24	0.21	0.42	0.16	0.32
Helianthus sp.	Sunflower	--	--	0.11	--	--	0.42	0.69	--	0.03	0.06	0.28	0.34	0.15	0.26
Hordeum sp.	Wild barley	0.33	--	0.44	0.47	1.9	0.83	--	--	0.31	0.22	0.68	0.90	0.50	0.64
Juncus sp.	Rush	--	1.5	--	0.94	--	--	--	--	0.61	0.74	--	--	0.31	0.58
Lepidium sp.	Peppergrass	0.83	1.5	4.4	0.94	0.32	6.7	1.7	1.4	1.9	1.7	2.5	2.8	2.2	2.2
Madia sp.	Tarweed	0.16	--	1.8	2.1	0.65	0.42	2.1	8.6	1.0	1.1	2.9	3.8	2.0	2.8
Mentzelia sp.	Blazing star	--	--	--	--	--	1.7	--	--	--	--	0.43	0.85	0.22	0.60
Phacelia sp.	Wild heliotrope	1.0	0.75	--	0.94	0.32	0.42	0.34	0.34	0.67	0.46	0.36	0.04	0.51	0.35
Phalaris sp.	Maygrass	3.8	3.8	4.9	3.5	2.3	10.0	9.0	6.6	4.0	0.62	7.0	3.4	5.5	2.8
cf. *Plantago* sp.	Plantain	0.16	--	1.8	0.47	0.32	0.83	3.4	11.7	0.61	0.82	4.1	5.3	2.3	3.9
Poa sp.	Bluegrass	--	1.5	--	--	--	--	--	--	0.38	0.75	--	--	0.19	0.53
Ranunculus sp.	Buttercup	--	--	--	0.23	--	--	--	0.69	0.06	0.12	0.17	0.34	0.12	0.25
Rumex/Polygonum	Dock or Knotweed	--	--	--	--	--	0.83	--	--	--	--	0.21	0.42	0.10	0.29
Salvia sp.	Sage	--	--	--	--	--	--	0.34	--	--	--	0.08	0.17	0.04	0.12
Scirpus sp.	Tule	--	--	--	--	--	--	--	0.34	--	--	0.08	0.17	0.04	0.12
Vulpia/Festuca	Fescue grass	5.2	6.0	14.2	5.9	4.8	35.8	15.2	13.1	7.8	4.3	17.2	13.2	12.5	10.4
Asteraceae A		3.0	9.1	9.8	9.9	4.8	17.5	8.6	16.2	8.0	3.3	11.8	6.1	9.9	5.0
FAMILY															
Asteraceae	Sunflower	3.8	9.1	6.7	4.0	5.2	17.1	24.5	14.1	5.9	2.5	15.2	8.0	10.6	7.4
Cyperaceae	Sedge	0.08	--	--	--	--	0.42	1.7	2.1	0.02	0.04	1.1	1.0	0.54	0.86
Fabaceae	Bean	0.50	2.3	2.9	1.2	1.9	7.9	5.9	13.1	1.7	1.1	7.2	4.7	4.5	4.3
Poaceae	Grass														
Unidentified		1.0	0.75	4.9	--	0.65	1.7	--	2.4	1.7	2.2	1.2	1.1	1.4	1.6
Fragments		19.0	69.4	45.3	45.5	46.5	134.2	58.3	26.2	44.8	20.6	66.3	47.2	55.6	35.6
Rosaceae	Rose	--	--	--	--	0.32	--	--	--	--	--	0.08	0.16	0.04	0.11
Unidentified embryos		0.16	1.5	--	0.94	5.8	10.0	0.69	4.1	0.65	0.70	5.1	3.9	2.9	3.5
Unidentified seeds		5.8	2.9	8.4	3.8	1.6	15.4	5.5	9.7	5.2	2.4	8.1	5.9	6.6	4.5
Unidentified seed fragments		8.7	67.2	51.6	41.6	34.5	115.4	30.7	44.5	42.3	24.7	56.3	39.8	49.3	31.6
Total Identified genus		31.1	49.5	66.9	40.9	66.3	149.3	93.1	105.1	47.6	15.2	103.5	34.6	75.3	39.0
Total Identified family		55.5	131.0	126.7	91.6	120.9	310.6	183.5	163.0	101.7	35.3	194.5	81.7	147.9	76.7
Total		70.1	202.6	186.7	137.9	162.8	451.4	220.4	221.3	149.3	59.5	264.0	127.9	206.7	110.9

s.d. = standard deviation.

Table 13. Ethnographic Use, Seasonal Availability, and Habitats of Identified Los Vaqueros Project Plant Remains

TAXON	COMMON NAME	GROWTH HABIT*	HABITATS*	ETHNOGRAPHIC USE**	SEED SEASONAL AVAILABILITY**	DISTURBANCE FOLLOWER?****
Achyrachaena mollis	Blow wives	Herb	Open grasslands	Seed eaten	Late spring	
Aesculus californica	Buckeye	Shrub	Shaded slopes and canyons	Nuts eaten	Fall	??
Amsinckia sp.	Fiddleneck	Herb	Open grasslands	None noted	Late spring	Yes
Arctostaphylos sp.	Manzanita	Shrub	Dry slopes and flats	Berries eaten	Summer (fall)***	??
Atriplex sp.	Saltbush	Shrub	Alkaline places	Seed, greens eaten	Late spring/early summer	??
Brodiaea sp.	Blue dick	Bulb	Varied; mostly dry places	Bulb eaten	Late winter, spring	??
Bromus sp.	Brome grass	Grass	Varied	Seed eaten	Late spring	Yes
Calandrinia sp.	Red maids	Herb	Disturbed areas	Seed eaten	Late spring	Yes
Chenopodium sp.	Goosefoot	Herb	Dry slopes and plains	Leaves eaten	Spring or summer	Yes
Clarkia sp.	Farewell to spring	Herb	Varied, grasslands	Seed eaten	Late spring/early summer	Yes
Claytonia sp.	Miners lettuce	Herb	Shaded or open grasslands	Leaves eaten	Spring	Yes
Deschampsia sp.	Hairgrass	Grass	Vernal pools, moist areas	None noted	Summer	No
Galium sp.	Bedstraw	Herb	Varied	Leaves used for medicine	Late spring/summer	No
Helianthus sp.	Sunflower	Herb	Disturbed areas	Seed eaten	Summer/fall	Yes
Hordeum sp.	Wild barley	Grass	Varied; open grasslands	Seed eaten	Late spring	Yes
Juncus sp.	Rush	Herb	Moist places	Foliage used for textiles	Summer	??
Lepidium sp.	Peppergrass	Herb	Grasslands	Whole plant eaten	Late spring	Yes
Madia sp.	Tarweed	Herb	Varied, grasslands	Seed eaten	Summer (fall)	Yes
Marah sp.	Wild cucumber	Vine	Varied, shaded places	Seed used for medicine, beads, sometimes eaten	Summer	??
Mentzelia sp.	Blazing star	Herb	Open grasslands	Seed eaten	Late spring	??
Phacelia sp.	Phacelia	Herb	Varied, grasslands	None noted	Late spring	Yes
Phalaris sp.	Maygrass	Grass	Moist places	None noted	Summer	No
Pinus sp.	Coulter or Gray pine	Tree	Dry slopes and flats	Nuts eaten	Late spring (green nuts) Fall (ripe nuts)	No
cf. *Plantago* sp.	Plantain	Herb	Varied	None noted	Late spring	??
Poa sp.	Bluegrass	Grass	Mostly moist places	Seed eaten	Late spring/summer	??
cf. *Potamogeton* sp.	Pondweed	Herb	Aquatic	None noted	Summer	??
Quercus sp.	Oak	Tree	Varied	Nuts eaten	Fall	??
Ranunculus sp.	Buttercup	Herb	Varied, moist areas	Seed eaten	Late spring	No
Rumex/Polygonum	Dock/Knotweed	Herb	Varied; often moist areas	Seed, leaves eaten	Late spring or summer	Yes
Salvia sp.	Sage	Herb or Shrub	Varied; disturbed areas or dry slopes	Seed eaten	Late spring	Some
Scirpus sp.	Tule	Herb	Marshes or meadows	Roots and leaves used for textiles; roots and shoots eaten	Summer	No
Umbellularia californica	Bay	Tree	Moist canyons, riparian zones	Nuts eaten	Fall	??
Vitis californica	Wild grape	Vine	Riparian areas	Berries eaten	Summer	??
Vulpia/Festuca sp.	Fescue grass	Grass	Dry open places, grasslands	Seed eaten	Late spring	Yes

* Munz 1968; Hickman 1993. ** Barrett and Gifford 1933; Bocek 1984; Chesnut 1902; DuBois 1935; Duncan 1963. *** Seasons in parentheses indicate secondary period past peak period. **** Sources: Stebbins 1965; Timbrook, Johnson, and Earle 1982; and personal communications, Michael Barbour, John Menke, Grady Webster, Jon E. Keeley, and Fred Hrusa.

SAMPLING ISSUES

How confident can one be in the results obtained from the various components of the Los Vaqueros project? Are the data sufficiently representative of the contents of these components that we can address questions of variability in cultural behavior? It is axiomatic in archaeobotany that reliance on charred remains in cultural inference is plagued by serious biases in the genesis, deposition, and preservation of the full range of plant use by ancient peoples (e.g., Miksicek 1987; Pearsall 1989). Rather than despair, however, we should focus on the demonstrated utility of charred plant remains, however biased, to cultural inference in archaeology throughout the world (e.g., Harris and Hillman 1989; Scarry 1993; Smith 1995). Preliminary indications are that these data are of similar value in central California (Wohlgemuth 1996a).

The question of representativeness consists of at least two variables. The first concern is whether sufficient samples were drawn from the full range of contexts at a given component. The second centers on whether sufficient materials were identified per component. Beginning with sample selection, it should be noted that every attempt was made by the project principals to collect sediment from the widest range of contexts. Samples were selected for flotation processing and analysis in conjunction with the author. As a result, the number of analyzed samples ranges from 8 to 17 (Table 14). The level of sampling for this number of site components rivals (cf. Wohlgemuth 1995) or exceeds all other projects to date in central California.

The issue of sufficient seeds is not so straightforward. The number of identified large seeds for all components ranges from 126 at CCO-696 Deep to 1,947 at CCO-458. Given the few (seven) large taxa identified in the project area, the sample size of large seeds appears adequate to express the variability in taxon frequency. But there is much more variance in the number of identified small seeds. The total number of small seeds identified to the family taxonomic level at CCO-696 Deep and CCO-637 is 22 and 63, respectively, and only 7 and 32, respectively, for those identified to genus. There are clearly too few seeds from the two earliest components to characterize small seed frequency. For CCO-696 West, -459, and -458, there are much larger samples that appear to suffice for frequency characterization. Because of the greater recovery of large seeds in the earliest components, however, the relationship of large to small seeds can be addressed for components spanning the entire sequence (cf. Wohlgemuth 1996a:95).

PRESERVATION BIAS

It appears initially that at least some of the broad patterns of large and small seed frequency hypothesized for central California (Wohlgemuth 1996a) also apply in the Los Vaqueros locality (Tables 2-11). But it is also possible that diachronic changes in the relationship between large seeds, particularly acorn, and small seeds are produced simply by differential preservation of taxa. Although charred plant remains are chemically inert and not as subject as bone to the vagaries of soil chemistry, their fragility leaves them vulnerable to mechanical degradation. Small seeds appear the most fragile, the relatively thin acorn nutshell more durable, while other large taxa are the most resilient charred remains. Intuitively, this makes sense. Seed coats of small taxa tend to be thinner than acorn nutshell, which is in turn thinner than other large seeds such as wild cucumber and bay nut, and the very robust manzanita and gray pine debris. Thus the Emergent period focus on small seeds could be merely a reflection of severe small seed deterioration in older components. Similarly, the apparent Upper Archaic focus on acorn nutshell could be hypothesized as reflecting substantial comminution of small

Table 14. Archaeobotanical Sampling Parameters for LVAP Sites

	CCO-696 Deep	CCO-637	CCO-696 West	CCO-636	CCO-459	CCO-458	Off-Site	Total
Processed Samples								
Number	11	10	21	1	19	30	4	92
Volume (liters)	171.7	231.9	309.1	20.0	411.0	213.3	52.9	1,409.9
Analyzed Samples								
Number								
Feature	--	7	15	--	4	4	--	30
Non-Feature	11	3	2	--	4	4	1	26
Total	11	10	17	--	8	8	1	56
Volume (liters)								
Feature	--	157.0	234.8	--	177.5	14.4	--	583.7
Non-Feature	171.7	74.9	31.5	--	53.3	40.1	12.0	403.5
Total	171.7	231.9	266.3	--	230.8	54.5	12.0	987.2
Identified Seeds								
Large Taxa								
Feature	--	751	1300	--	244	1152	--	3447
Non-Feature	126	384	318	--	262	810	3	1903
Total	126	1135	1618	--	506	1962	3	5350
Small Taxa (to genus)								
Feature	--	28	96	--	181	435	--	740
Non-Feature	7	4	29	--	82	270	--	392
Total	7	32	125	--	263	705	--	1132
Small Taxa (to family)								
Feature	--	56	217	--	670	876	--	1819
Non-Feature	22	7	49	--	204	606	2	890
Total	22	63	266	--	874	1482	2	2709

seeds, while the more durable acorn nutshell was not as severely affected. Finally, the apparently generalized Middle Archaic economy may reflect further degradation of acorn debris with respect to other, more robust, large seeds. The degradation model is supported by observations that wood charcoal frequency appears to break down at a more or less constant rate in central California, and one day may be useful as a broad-brush relative dating technique (Wohlgemuth 1996b).

To ascertain the effects of differential preservation on the Los Vaqueros data, three measures were developed. First, simple wood charcoal frequency (to 1-mm grade) was calculated per component (Wohlgemuth 1996b). Second, reasoning that more degraded assemblages will feature large seeds broken into smaller pieces, the mean size of large seed fragments was calculated for each component from frequencies of weights and counts (Wohlgemuth 1989). Finally, small seed degradation should be reflected in declining numbers of identified seeds with respect to unidentified small seed fragments. Further, the number of seeds identified to genus should decline with respect to those identified only to the family level. Both indices were calculated per component area and are shown in Table 15. Table 16 puts the Los Vaqueros wood charcoal frequency data in regional context.

Table 15. Seed Degradation Indices for LVAP Sites

	CCO-696 Deep	CCO-637	CCO-696 West	CCO-459	CCO-458
Wood Charcoal Frequency (grams/liter)					
	0.010	0.034	0.165	2.47	2.40
Large Taxa Mean Weight (mg)					
Acorn	0.22	0.39	0.25	0.26	0.33
Manzanita	0.50	0.89	0.90	5.25	4.60
Wild Cucumber	0.47	0.72	0.45	1.19	1.86
Bay	--	0.43	0.41	0.35	0.46
Buckeye	--	0.55	0.53	0.35**	0.45
Gray pine	--	2.62	2.00*	0.88	1.39**
Total	0.30	0.60	0.45	0.36	0.40
Small Seed Identification Success (percent)					
Identified to Genus	9.9	24.9	25.2	36.6	31.8
Identified to Family	32.6	48.3	62.5	70.1	71.6
Unidentified Fragments	46.0	47.9	23.9	27.9	23.9

* 3 samples ** 4 samples

The data are somewhat equivocal, but all lines of evidence clearly do not demonstrate uniform decay with respect to time as predicted by the degradation hypothesis. The wood charcoal frequency from Los Vaqueros fits quite well with predictions of the differential preservation model for continuous decay, falling within the ranges predicted for each time frame.

A study in Shasta County (Wohlgemuth 1989), found that gray pine and manzanita particle size did not significantly decay over time, in contrast to acorn, which did. At Los Vaqueros, however, the large seed taxa that best mimic charcoal frequency are manzanita and wild cucumber. These are among the most robust seeds, predicted to resist decay operating on much softer wood charcoal. Acorn, bay, and buckeye nutshell do not show the marked fluctuations in particle size seen for manzanita, wild cucumber, and gray pine. Indeed, the former nutshells do not show any strong tendency to become smaller with age as predicted by the decay model, with the possible exception of acorn in the early Holocene deposit (there is insufficient data to ascertain whether early Holocene bay or buckeye nutshell behaves similarly). Counter to the predictions of the decay model, gray pine fragments are much larger at CCO-637 than at -459 (there are insufficient data to characterize CCO-696 West or -458).

The small seed indices may better conform to the decay model. The proportion of unidentified small seed fragments decreases dramatically from CCO-696 Deep and CCO-637 to CCO-696 West. But the fragment proportion is relatively constant between CCO-696 West, -459, and -458. The proportion of small seeds identified to both genus and family appears to increase slightly at the two latest sites. Only the fragment proportion, however, decreases dramatically following the wood

Table 16. Wood Charcoal Density for Selected Central California Archaeological Sites

Site	Age	Charcoal Density (grams/liter of soil)
SOL-315	430±105 B.P. (WSU 4416)	21.93
SUT-17	Emergent period	7.36
SON-159	Emergent period	2.93
CCO-459	ca. 1265-605 B.P.	2.47
CCO-458	ca. 465 B.P.	2.40
ALA-555	Emergent period	1.79
SOL-356	Emergent period	1.79
ALA-42	Archaic/Emergent Transition	0.81
SOL-315	1850±90 B.P. (WSU 4419)	0.419
SOL-355	Upper Archaic period	0.311
SON-1695	Upper Archaic period	0.253
SOL-363	Upper Archaic period	0.042
CCO-696 West	ca. 2800-1300 B.P.	0.165
SON-2098	Middle Archaic period	0.190
SOL-315	Middle Archaic period	0.025
CCO-637	ca. 5800-2600 B.P.	0.034
CCO-696 Deep	ca. 9800-7400 B.P.	0.010

Note: Data from Wohlgemuth (1996b; 1996c)

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charcoal decay model, and the most pronounced change occurs between CCO-637 and -696 West, in contrast to the striking wood charcoal change between CCO-696 West and the two late sites.

The indices developed to track preservation bias do not appear to conform to predictions of the degradation model. While the data are somewhat ambiguous, they do not seem to show that changes in the central California archaeobotanical record are the product of decay rather than cultural behavior. In sum, it appears at this point that much--probably the majority--of the variability in the Los Vaqueros archaeobotanical record follows from cultural behavior rather than differential preservation. Discriminating among these behaviors constitutes the remainder of this chapter.

HABITAT USE AND SEASONAL INDICATORS

Habitat Use

Two related issues are addressed by examining the modal habitats of identified seeds at Los Vaqueros. First is the range and relative intensity of habitats used, an important aspect of differential plant resource collection. The measure employed for habitat use is the proportion of seeds identified to genera diagnostic of particular habitats to all diagnostic genera. Proportions are calculated separately for large and small seeds, and genera with species that grow in more than one habitat (such as *Chenopodium*) are excluded. Similarly, the implications of the use of proximal or distant resources for prehistoric mobility and territorial range can be considered. Since the modern distribution of large

seeds is much better understood than that of small seeds, changes in mobility and territory size are examined using only large seeds.

Briefly, five habitats abstracted from studies of of the vegetation of the Kellogg Creek watershed (Jones & Stokes 1989) include the lowland grassland/oak savanna, seasonal wetlands and moist areas, perennial wetlands, xeric uplands, and moist slopes and canyons. The grassland/savannas are extensive; they dominate the lower, eastern portion of the watershed where the excavated archaeological sites are located. The majority of small seeds, acorns, and wild cucumber were probably gathered from this zone. Seasonal wetlands as used here are composed of a variety of habitats, including vernal pools and seasonally moist alkaline habitats, which are associated with the valley bottoms along the lower portions of Kellogg Creek. These tend to be concentrated in the sites' vicinity and in the lower elevations to the northeast towards Byron. Important small seed genera used from this habitat include hairgrass and maygrass. Perennial wetlands in the watershed are very rare and comprise very small areas, such as pools in the riparian zone of Kellogg Creek, which are moist year round; very few seeds were recovered typical of this habitat. Xeric uplands refers to the woodlands and chaparral scrub communities atop the higher ridges (above about 1400 ft elevation) that run northwest-southeast in the western limits of the watershed. Gray pine nuts and manzanita berries would have been gathered here. Mesic north-facing slope and canyon communities are found on the lower elevations of these ridges, and to the southeast of the project sites near the Vasco Caves. Food resources collected from this zone include bay and buckeye nuts.

The proportion of habitats represented by diagnostic seeds is shown in Table 17. The large seed data indicate use of mostly local savanna taxa at CCO-696 Deep. This is followed by much expanded exploitation of xeric uplands during CCO-637 and -696 West occupations. Increased use of the uplands during these two occupations is supported by the peak in ubiquity (proportion of samples with taxa present; see Assemblage Comparisons below) of manzanita, and by a pronounced peak in the ubiquity of gray pine at CCO-637. Residents of CCO-696 West apparently gathered more bay and buckeye from the north-facing slopes. Large seeds at CCO-459 are dominated by savanna taxa. Relative to CCO-458, -459 shows greater use of upland taxa but virtually no residue from the north-facing slopes. It may be that the location of CCO-459 about 1/2 mile closer to the western uplands than CCO-458 facilitated preparation of the upland taxa, perhaps on return from upland forays. While CCO-458 also features large seeds predominately from the oak savanna, the abundance of bay shows increased exploitation of the moist slope habitats as well.

The small seeds from CCO-696 Deep and -637 are primarily grassland/savanna taxa, but the samples are too small to be really informative. The larger small seed sample at CCO-696 West is squarely dominated by grassland taxa. Seeds from seasonal wetlands comprise a much greater proportion of both the CCO-459 and -458 small seed assemblages, reflecting greater use of these habitats in the Emergent period.

Seeds diagnostic of grassland/savannas and seasonal wetlands probably represent use of resources more immediately proximal to the archaeological sites. Seeds of the xeric uplands and moist slopes, however, are significantly further from the sites. Maps compiled by the Soil Conservation Service (1977) and Jones & Stokes (1989) have been augmented by a brief site visit by the author, and observations over several years in the Los Vaqueros locality by botanist Lori May (personal communication, 1997). Moist slope habitats where buckeye and bay nuts could be obtained are located 1.5 to 2 air miles southwest and southeast from the archaeological sites. Manzanita grows about 2 air miles to the west and southwest, while gray pine is 2 to 3 air miles away. Perusal of topographic maps

Table 17. Proportion of Diagnostic Seeds by Habitat and Component

	CCO-696 Deep	CCO-637	CCO-696 West	CCO-459	CCO-458
Large Seeds					
Grassland/oak savanna	88.5	39.2	28.7	71.6	62.2
Xeric uplands	9.2	50.2	51.1	26.5	10.8
Moist slopes/canyons	2.3	10.6	20.1	2.0	26.9
Total diagnostic large seeds	126	1135	1618	503	1947
Small Seeds					
Grassland/oak savanna	100	75.0	86.4	73.5	69.1
Seasonal wetlands	--	25.0	12.1	26.5	30.8
Perennial wetlands	--	--	0.06	--	0.04
Total diagnostic small seeds	7	27	108	241	609

suggests that routes avoiding steep terrain from the sites to stands of these resources could add as much as 1 to 1.5 miles travel.

There appear to have been several shifts in catchment size and mobility throughout the sequence. While there were a few pieces of manzanita residue at CCO-696 Deep, (probably local) acorn nutshell is the predominant resource. The few small seeds identified from this component are all grassland/savanna resources. It may be that this component represents very short term use, with a resource focus upon immediately available plants. It is also conceivable that a moister climate during the early Holocene may have allowed plant resources now found at some distance from the project sites to expand their range downslope and further east, closer to CCO-696. In that case, CCO-696 Deep may represent an even greater focus on plant resources of the immediate vicinity. In any event, the Early Holocene component at CCO-696 evidences the greatest proportion of the most proximal resources at any time in the Los Vaqueros sequence.

The CCO-637 and -696 West assemblages, by contrast, show a much greater use of the distant uplands and north slopes. This may in turn indicate more lengthy site use during these occupations, where forays could be made further from sites, then functioning as residential bases. The drier mid-Holocene climate prevailing during the CCO-637 occupation probably served to move most nut and berry crop populations higher up the flanks of Mt. Diablo than their current location. Thus the CCO-637 data, especially the high frequency of gray pine nutshell, probably reflect an even more extensive range than during CCO-696 West occupations. Conversely, the return to more mesic conditions during the CCO-696 West times probably allowed these same species to expand their range into lower elevations. Thus while CCO-637 and -696 West have rather similar large seed assemblages, the latter data likely reflect a smaller foraging radius than is indicated at CCO-637.

While some use of xeric upland resources continued at CCO-459 and -458, there is a marked shift in emphasis back to local savanna resources, and a much greater contribution from small seeds of seasonal wetlands. This Emergent period change which appears tied to a different subsistence emphasis and economic intensification/extensification processes, is discussed in some detail below.

Seasonal Indicators

The proportion of the various seasonal indicators of large and small seeds is shown in Table 18. The preponderance of small-seeded taxa identified at Los Vaqueros ripen in the late spring after the onset of the dry season. A smaller number--many associated with seasonal wetlands--ripen in the summer, as do manzanita berries and wild cucumber nuts. Taxa indicative of fall use are acorn, bay nut, and buckeye. Winter plant indicators are rare in California. Bulbs of *Brodiaea* and related genera are best dug in the moist soils of winter or early spring. As with the data presented for habitat indicators above, some taxa had to be excluded because their genus level identification precludes distinguishing between species that ripen in different seasons (e.g., *Chenopodium*). In the following discussion, it is important to note that virtually all taxa could be stored, and that the season of ripening and gathering is not necessarily a good indicator of the season of occupation and consumption.

Large seed seasonal indicators from CCO-696 Deep show evidence of gathering in summer and fall, but the tiny sample of small seeds hardly constitutes reliable evidence of patterned spring plant collecting. Fall indicators are the most common, and it is possible that the primary occupation during the early Holocene was in that season, perhaps focused on acorn collecting. Large seed indicators from CCO-637 are evenly split between summer and fall, and may support the notion of lengthier

Table 18. Seasonal Botanical Indicator Data (Percent) from Los Vaqueros Components

	CCO-696 Deep	CCO-637	CCO-696 West	CCO-459	CCO-458
<u>Large Seeds</u>					
Summer-ripening	38.5	52.0	51.7	27.8	11.4
Fall-ripening	61.5	48.0	48.3	72.3	88.6
Total diagnostic large seeds	126	1135	1618	503	1947
<u>Small Seeds</u>					
Spring-ripening	84.2	75.0	84.2	72.9	66.7
Summer-ripening	15.8	25.0	15.8	27.1	33.2
Total diagnostic small seeds	7	27	108	248	664
Brodiaea bulbs	--	--	+	+	--

occupations than proposed for CCO-696 Deep earlier in the habitat discussion. As with the latter component, however, the very small sample of small seeds does not constitute substantial evidence for the use of CCO-637 during the late spring. While this argument seems solid, it is important to note that small seed use appears not to have begun in earnest until the Emergent period, and it is possible that both CCO-696 Deep and -637 may well have been occupied during the spring. Activities performed in the spring may not have included focused gathering of small seeds. Evidence from artifact assemblages, however, suggests that occupations were relatively ephemeral at these earliest two components; thus the dearth of spring indicators could well be consistent with minimal spring occupation.

The proportion of summer and fall large seed indicators in Upper Archaic CCO-696 West is virtually identical to that at CCO-637. But the larger sample of identified small seeds allows greater confidence in inferring spring collecting during the Upper Archaic at CCO-696. Not only is there greater evidence for spring collecting, the identification of winter- or early-spring ripening bulbs shows a fuller range of collecting seasons at CCO-696 West. The most parsimonious explanation is that the occupation at this component was for longer spans of the year, perhaps year round.

Interpretation of seasonal indicators at site CCO-459 differs from the occupation sites. Since there would be no one around to protect stores from vermin, it can be presumed that no resources were stored at this uninhabited processing location. While it is certainly possible that some stored resources were taken out of season to the processing station, seasonal indicators at CCO-459 probably reflect more accurately the seasonal variation in site use than do occupation site data. Seeds and bulbs indicative of the full range of seasonal plant resource availability were processed at CCO-459. Large seeds collected in the fall are more common than summer-ripening ones. Relative to the earlier components, CCO-459 evidences increased processing of summer-ripening small seeds, although the bulk of small seeds processed at the site appear to have been spring ripening.

No *Brodiaea* type bulbs were identified at CCO-458, but otherwise the data show use of plants gathered from spring through fall. While an increase in small seeds of summer-ripening seasonal wetlands is evident relative to all previous components, the high frequency of spring-ripening seeds clearly evidences intensive spring gathering as well. Similarly, the abundance of acorn and bay nutshell at CCO-458 reflects intensive gathering of fall nut crops.

For the most part, these data show that there is a dichotomy in the range of gathering indicators between the two earliest occupations and those postdating ca. 2500 B.P. If the collecting season indicators are indeed reasonable markers of the range of seasons of site habitation as well as gathering, the overall impression is of more prolonged and intensive occupations from the earliest to the most recent components in the Kellogg Creek watershed. The absence of *Brodiaea* bulbs may indicate a shift away from winter habitation at CCO-458, but this and other seasonality-based inferences should be corroborated with faunal seasonal indicators.

ASSEMBLAGE COMPARISONS AND RESOURCE INTENSIFICATION MODELS

Tables 19 and 20 show three abundance measures for large and small seeds, respectively, for each of the five component areas sampled in the Los Vaqueros Project area. Ubiquity is the proportion of samples in which a taxon is present of the total site component samples. Density is the mean frequency of a taxon per liter of sediment. Proportion is the percentage of the mean total of identified

Table 19. Los Vaqueros Site Large Taxa Mean Ubiquity, Density, and Proportion

	CCO-696 Deep			CCO-637			CCO-696 West			CCO-459			CCO-458		
	ubiq	dens	%	ubiq	dens	%	ubiq	dens	%	ubiq	dens	%	ubiq	dens	%
TAXON															
Quercus sp.	81.8	0.11	50.7	100	1.7	31.1	100	1.9	27.1	100	5.8	68.6	100	41.0	59.7
Arctostaphylos sp.	45.4	0.02	9.2	100	2.4	44.0	100	3.5	49.9	75.0	2.1	24.9	87.5	6.9	14.7
Marah sp.	63.6	0.08	36.9	100	0.44	8.1	47.1	0.09	1.3	75.0	0.25	3.0	62.5	0.82	1.2
Umbellularia californica	9.1	0.001	0.5	100	0.47	8.6	100	0.66	9.4	50.0	0.11	1.3	100	16.7	24.3
Aesculus californica	9.1	0.004	1.8	70.0	0.11	2.0	88.2	0.74	10.5	50.0	0.06	0.7	100	1.8	2.6
Pinus sp.	--	--	--	80.0	0.34	6.2	17.6	0.06	0.9	50.0	0.14	1.7	25.0	0.53	0.8
Clarkia sp. capsule	9.1	0.002	0.9	--	--	--	17.6	0.008	0.1	12.5	0.001	0.01	87.5	0.89	1.3
Total		0.22			5.48			6.98			8.4			68.6	
Brodiaea/ *Dichelostemma* sp.	--	--		--	--		5.9	0.002		50.0	0.06		--	--	
Quercus sp. attachment disks	--	--		20.0	0.015		41.2	0.04		25.0	0.01		25.0	0.04	
Wood charcoal (sorted to 1-mm grade) grams		0.010			0.034			0.165			2.47			2.40	

Table 20. Los Vaqueros Site Small Taxa Mean Ubiquity, Density, and Proportion

	CCO-696 Deep			CCO-637			CCO-696 West			CCO-459			CCO-458		
	ubiq	dens	%	ubiq	dens	%	ubiq	dens	%	ubiq	dens	%	ubiq	dens	%
TAXON															
Achyrachaena mollis	--	--	--	--	--	--	--	--	--	12.5	0.02	T	62.5	1.2	0.8
cf. *Amsinckia* sp.	9.1	0.005	4.0	30.0	0.024	7.8	35.3	0.041	3.4	75.0	0.92	2.8	100	2.6	1.8
Atriplex sp.	--	--	--	--	--	--	--	--	--	--	--	--	37.5	01.86	0.6
Bromus sp.	--	--	--	--	--	--	5.9	0.003	0.2	62.5	0.38	1.2	100	2.6	1.8
Calandrinia sp.	--	--	--	20.0	0.006	2.0	11.8	0.014	1.2	87.5	3.4	10.5	100	9.6	6.5
Chenopodium sp.	--	--	--	40.0	0.038	12.3	47.1	0.069	5.8	50.0	0.25	0.8	87.5	4.6	3.1
Clarkia sp.	9.1	0.005	4.0	40.0	0.032	10.4	82.3	0.136	11.3	--	--	--	87.5	4.0	2.7
Claytonia sp.	18.2	0.011	8.8	--	--	--	11.8	0.013	1.1	50.0	0.36	1.1	50.0	2.0	1.4
Deschampsia sp.	--	--	--	30.0	0.023	7.5	11.8	0.011	0.9	87.5	2.5	7.7	100	11.3	7.6
*Erodium** sp.	--	--	--	--	--	--	5.9	0.004	*	12.5	0.002	*	--	--	--
Galium sp.	9.1	0.005	4.0	--	--	--	17.6	0.016	1.4	62.5	0.12	0.3	25.0	0.16	0.1
Helianthus sp.	--	--	--	--	--	--	--	--	--	25.0	0.04	0.1	37.5	0.15	0.1
Hordeum sp.	--	--	--	--	--	--	--	--	--	--	--	--	62.5	0.50	0.3
Juncus sp.	--	--	--	--	--	--	--	--	--	37.5	0.13	0.4	25.0	0.31	0.2
Lepidium sp.	--	--	--	--	--	--	11.8	0.009	0.8	100	0.94	2.9	100	2.2	1.5
Madia sp.	9.1	0.006	4.8	--	--	--	11.8	0.011	0.9	50.0	0.24	0.7	87.5	2.0	1.4
Mentzelia sp.	--	--	--	--	--	--	--	--	--	--	--	--	12.5	0.22	0.1
Phacelia sp.	--	--	--	--	--	--	23.5	0.053	4.4	62.5	0.27	0.8	87.5	0.51	0.3
Phalaris sp.	--	--	--	10.0	0.007	2.3	41.1	0.035	2.9	87.5	1.3	4.0	100	5.5	3.7
cf. *Plantago* sp.	--	--	--	--	--	--	--	--	--	75.0	0.46	1.4	87.5	2.3	1.6
Poa sp.	--	--	--	--	--	--	--	--	--	25.0	0.09	0.3	12.5	0.19	0.1
Polygonum sp.	--	--	--	--	--	--	5.9	0.002	0.2	--	--	--	--	--	--
cf. *Potamogeton* sp.	--	--	--	--	--	--	5.9	0.002	0.2	--	--	--	--	--	--
Ranunculus sp.	--	--	--	--	--	--	5.9	0.006	0.5	--	--	--	25.0	0.12	T
Rumex/Polygonum sp.	--	--	--	--	--	--	--	--	--	--	--	--	12.5	0.10	T
Salvia sp.	--	--	--	--	--	--	11.8	0.011	0.9	37.5	0.15	0.5	12.5	0.04	T
Scirpus sp.	--	--	--	--	--	--	5.9	0.004	0.3	--	--	--	12.5	0.04	T
Vulpia/Festuca	9.1	0.006	4.8	30.0	0.028	9.1	35.3	0.044	3.6	75.0	4.3	13.3	100	12.5	8.4
Asteraceae A	--	--	--	--	--	--	17.6	0.018	1.5	100	4.3	13.3	100	9.9	6.7
Unknown A	--	--	--	--	--	--	17.6	0.091	7.5	--	--	--	--	--	--
FAMILY															
Apiaceae	--	--	--	--	--	--	5.9	0.002	0.2	12.5	0.02	T	--	--	--
Asteraceae	9.1	0.022	17.6	30.0	0.021	6.8	29.4	0.021	1.8	100	2.2	6.8	100	10.6	7.2
Cyperaceae	--	--	--	--	--	--	17.6	0.009	0.8	12.5	0.004	T	50.0	0.54	0.4
Fabaceae	27.3	0.029	23.2	20.0	0.029	9.4	35.3	0.079	6.6	87.5	1.0	3.1	100	4.5	3.0
Papaveraceae	--	--	--	--	--	--	11.8	0.029	2.4	12.5	0.03	T	--	--	--
Poaceae															
unidentified	--	--	--	--	--	--	--	--	--	50.0	0.14	0.4	75.0	1.4	0.9
fragments	36.4	0.035	28.0	60	0.101	32.98	82.3	0.463	38.6	100	8.9	2.7	100	55.6	37.2
Rosaceae	--	--	--	--	--	--	--	--	--	--	--	--	12.5	0.04	T
Unidentified seeds		0.081			0.014			0.204			1.1			6.6	
Unidentified seed fragments		0.176			0.304			0.458			12.9			49.3	
Total Identified**		0.125			0.307			1.200			32.4			147.9	
Total		0.383			0.635			1.919			46.2			206.7	

* Introduced taxon. ** Genus or family; does not include filaree. T = trace.

seeds occupied by the mean density of a particular taxon. For small seeds, the mean proportion is calculated using total seeds identified to family.

Although the same taxa tend to be found throughout the sequence, each assemblage differs in significant ways. In the early Holocene component at CCO-696, all charred constituents, including wood charcoal, are rare, while small seeds are virtually absent. By any measure, acorn nutshell is the most common constituent, occurring in more than 80% of CCO-696 Deep samples, with wild cucumber nutshell quite frequent, and manzanita fragments present in smaller numbers.

Large seeds are more than 20 times as common at CCO-637 as at -696 Deep. Manzanita, acorn, wild cucumber, and bay are found in all samples, while buckeye and gray pine are found in the majority of samples. Manzanita is the most common large seed residue. However, there is no commensurate increase in identified small seeds, which are only slightly more than twice as common as those in the CCO-696 Deep assemblage.

The large seed assemblage of CCO-696 West is broadly similar to -637 in ubiquity and density, and again manzanita is the most abundant large taxon, followed by acorn. CCO-696 West has less wild cucumber and gray pine than -637, but contains much more buckeye. A diversity of small seeds distinguishes the CCO-696 West assemblage from -637, and several taxa show increased use, particularly farewell to spring. Goosefoot, fiddleneck, fescue, and maygrass are also found repeatedly.

While there is a trend for slightly increasing frequencies of most classes of plant remains from CCO-696 Deep, through -637, to -696 West, frequencies of wood charcoal and small seeds dramatically increase at -459. Interestingly, of the large seeds, only acorn debris follows this pattern; others decline or increase only slightly in frequency. But the most important difference between CCO-459 and earlier components appears to lie in the incidence of small seeds. Identified small seeds are more than 25 times as abundant at CCO-459 than at -696 West, and identified genera are much more ubiquitous at -459. Common small seeds include fescue, an unidentified genus of the sunflower family (Asteraceae A), red maids, hairgrass, and to a lesser extent, maygrass and fiddleneck. Notably absent is farewell to spring, and goosefoot and bay are also conspicuously rare with respect to other site components.

Both large and small seeds are much more common at CCO-458 than at any other component. Large seeds are more than eight times as common at CCO-458 than at -459, while small seeds are more than four times as abundant. Acorn dominates the large seed assemblage, but of note are major increases in bay nutshell and farewell to spring capsule. The profuse small seed assemblage at CCO-458 features many of the same common taxa described at -459, including fescue, hairgrass, red maids, and Asteraceae A. Less abundant but ubiquitous taxa include maygrass, brome grass, and fiddleneck. In contrast to CCO-459, farewell to spring and goosefoot are quite common at -458.

How do these changes in the seed assemblages for the 9,500-year Los Vaqueros sequence speak to the resource intensification models proposed elsewhere in central California? Two measures--the proportion of acorns in the large seed category, and the ratio of acorn debris to small seeds--have been used to argue for subsistence change as predicted by intensification models (Wohlgemuth 1996a). Table 21 lists these indices for the Los Vaqueros components.

There are several deviations in these data from the predictions of the intensification models. First, acorn proportion is greater at CCO-696 Deep than at -637 and -696 West. This is in contrast to the prevailing models, which predict a greater acorn proportion at Upper Archaic CCO-696 West

Table 21. Acorn Proportion and Acorn:Small Seed Ratios for the Los Vaqueros Sites

	CCO-696 Deep	CCO-637	CCO-696 West	CCO-459	CCO-458
Acorn Proportion of Large Seeds	50.7	31.1	27.1	68.6	59.7
Acorn Proportion of Local Large Seeds	57.3	79.4	95.1	95.9	96.0
Acorn:Small Seed Ratio	0.88	5.54	1.58	0.18	0.28

following from an assumed acorn-intensive economic pattern (Wohlgemuth 1996a). This apparently damaging evidence, however, may not actually contradict the model. Instead, the high acorn proportion may follow from what appears to be use of local, on-site resources during the early Holocene, in contrast to the more far-ranging foraging for other nuts and berries evidenced at CCO-637 and -696 West (see Habitat Use above). When considering only large seeds that are locally available in the immediate site vicinity (acorn and wild cucumber nutshell, and farewell to spring capsule), a different pattern more congruent with the predictions of the intensification models emerges. Still, it is surprising to find such dominance of acorn in the early Holocene component. This dominance is reinforced by the greater early Holocene ubiquity of acorn than of any other taxon (Table 19); acorns seem to have been more regularly used than any other plant resource in this early Holocene encampment.

Not only is the local resource-based early Holocene acorn proportion the lowest value, this proportion steadily increases through the sequence until it stabilizes at CCO-696 West and the Emergent period sites (Table 21). This reconfiguration using only local resources also helps explain the apparently contradictory lower acorn proportion at CCO-696 West with respect to the Emergent period; at sites elsewhere in central California, these proportions tend to be quite similar for Upper Archaic and Emergent period sites located in the same locality, and have been interpreted as indicating intensive acorn utilization in both periods.

The ratio of acorn nutshell to identified small seeds also does not completely conform to the model's predictions. The early Holocene and Middle Archaic components would be predicted to have the lowest ratios, the Upper Archaic component the highest, and the Emergent period sites intermediate values. The Upper Archaic ratio is substantially higher than the Emergent period values, confirming the trend found in three other central California localities (Wohlgemuth 1996a). But the CCO-696 Deep ratio is three to five times higher than either Emergent period site, and Middle Archaic CCO-637 has far and away the highest acorn to small seed ratio. The operating factor here elevating the two earlier component values, particularly CCO-637, is the very low frequency of identified small seeds. This could follow from the summer- and fall-based occupation hypothesized for CCO-696 Deep and -637. While the predictions of the intensification model are not wholly congruent with the early Holocene and Middle Archaic ratios, there is good evidence of increased use of acorns in the Middle Archaic and Upper Archaic components by their substantially larger values for both the acorn to small seed ratio and the local-based acorn proportion.

Eliminating the more distant nut and berry crops from the assemblage comparisons, however, does not account for the range of variability between the components. Not only does there appear to be increased use of acorns during the Middle Archaic and Upper Archaic components, the increased

use of all nuts and berries (except wild cucumber) argues that these economies were based upon the more *balanced* use of a variety of large-seeded resources. Significantly, neither the CCO-637 nor the -696 West assemblages exhibit the heavy reliance on small seeds observed in Emergent period components. Either the Los Vaqueros locality was not occupied during the seasons that small seeds would be gathered, or intensive small seed use was not part of these economies. For two reasons the latter argument makes more sense. First, no earlier sites in interior central California have yielded the dense small seed assemblages typical of all robust Emergent period sites investigated to date. Second, this locality is clearly a very good place to gather small seeds, evidenced by the Emergent period assemblages; indeed, the abundant small seeds of the grasslands and oak savannas of the Los Vaqueros locality may have been a major attraction for Emergent period populations. If there were Middle or Upper Archaic small seed exploitation locales, Los Vaqueros would probably have been one of them.

While no intensive use of small seeds occurred at Los Vaqueros until the Emergent period, there are indications of greater small seed use at CCO-696 West than at earlier -637. The range of taxa used expanded from 7 to 20, density increased fourfold, and the ubiquity of most of the more common taxa increased. Of particular note is the elevated ubiquity and density of farewell to spring. There seems to have been a change to more regularized, but clearly not intensive, use of small seeds at CCO-696. This change is probably related to the establishment of a more permanent settlement than the transitory campsite at CCO-637.

Accompanying the increased use of small seeds at CCO-696 West is a high frequency of buckeye, which comprises over 10% of the identified large taxa, more than four times the proportion at any other component. This is interesting, as buckeye is clearly the most expensive large seeded resource to process, as it requires even more extended leaching than acorns. The increased use of buckeye at CCO-696 West may reflect the more serious consequences of inevitable acorn crop failures to a sedentary population than to a more mobile population using CCO-637. As such, the high incidence of buckeye might constitute evidence for greater resource stress at CCO-696 West than during any other occupation in the Los Vaqueros sequence. The significance of this is underscored by the data from CCO-458, where bay nut use greatly expands, while buckeye use declines with respect to -696 West, despite the co-occurrence of these two shrubs in north slope habitats. This interpretation of the high incidence of buckeye at CCO-696 as a measure of resource stress is clearly somewhat speculative, and needs to be confirmed by other lines of evidence.

In a different vein, there is a gradual decline in incidence of wild cucumber from its high at CCO-696 Deep, to lesser but still significant levels at -637, and to more minimal levels at -696 West and the Emergent period sites. This is consistent with findings at other localities in central California, where wild cucumber often drops out of the latter part of the cultural sequence (e.g., Hildebrandt and Mikkelsen 1993; Wohlgemuth 1996a). This is counter to diet breadth models, which specify that resources should be added, not subtracted, to diets with increasing resource stress through time (Bettinger 1991). It is conceivable that in at least some places, wild cucumber seeds were not used as a food source, but as beads (Chesnut 1902). In this regard, it is interesting that the frequency of wild cucumber after the early Holocene tracks well with gray pine nuts, which were also used as beads (Bennyhoff and Hughes 1987).

In contrast to all earlier components, the Emergent period data conform well to the predictions of the intensification models. Acorns dominate the large seed assemblage, and small seeds are very abundant at each site. Whether or not this subsistence pattern emerged in the Emergent period due to population/resource imbalances or social circumscription as hypothesized by Basgall (1987; Basgall and Bouey 1991) and Wohlgemuth (1996a), the Emergent period adaptation is clearly quite different

from the Upper Archaic mode. Intensive small seed use required the use of different habitats, gathering and processing technologies, and perhaps social organization and intergroup territorial relationships. One consequence appears to have been the restriction of territory habitually exploited, as measured by the decline in distant nut and berry residues. Another seems to have been the broadening of the niche to include greater use of summer-ripening small seeds, mostly from seasonal wetlands, particularly hairgrass and maygrass. These strategies appear to have worked rather successfully, if the lower incidence of buckeye at the Emergent period sites is an indication of avoiding resource stress.

Of additional interest to the Emergent period picture is the processing location at CCO-459. There are several discontinuities in its seed assemblage from both contemporaneous CCO-458 and the earlier deposits. There is virtually no bay nut refuse at CCO-459. Either bay nuts were hulled before they were brought to the site and pounded, or they were not pounded at CCO-459 at all. Even more peculiar is the utter absence of farewell to spring seed (one capsule fragment was found), so ubiquitous and numerous at CCO-696 West, -458, and at sites throughout central California (Wohlgemuth 1996a). Apparently, farewell to spring seed was not ground at the site; it is inconceivable that absolutely no processing errors leading to charred seeds were made with farewell to spring when so many were made with other taxa (20 small seed genera were identified, 14 with at least 50% ubiquity). Why farewell to spring would not be ground at CCO-459 is difficult to explain unless we consider the possibility that this taxon was not habitually pulverized at other sites either, and that its common occurrence throughout the Los Vaqueros sequence and interior central California is explained by processing technology that did not incorporate grinding or pounding. Similar logic may hold for the case of goosefoot, which was found in very low frequency at CCO-459, but is common at all other sites except -696 Deep. On the other end of the ledger at CCO-459 are taxa found in higher proportions than at any other site. The most prominent of these is red maids, but fescue and Asteraceae A are also included.

Finally, CCO-459 has a lower acorn to small seed ratio than -458. This highlights an important feature of the CCO-459 assemblage: acorn nutshell is not that common with respect to small seeds at this bedrock mortar station. It is of course possible that acorns are underrepresented at CCO-459 because they were hulled elsewhere prior to processing, or were not frequently incorporated in the associated features and deposit. Regardless of this possibility, the salient finding of archaeobotanical investigations at CCO-459 is that a whole gamut of large- and small-seeded resources were processed here in addition to acorns. The impression at this point is that the small-seeded resources so abundant at CCO-459 were indeed the primary resource type processed there. In any event, these data clearly demonstrate that isolated bedrock mortars, at least in the East Bay Area, and probably throughout central California as well, cannot be interpreted simply as acorn-processing locations. Similarly, the diverse small seed assemblages in the Los Vaqueros sequence postdating the early Holocene, exclusively associated with mortar and pestle grinding apparatus, show that a wide variety of plant products was also processed using portable mortar and pestle technology.

CONCLUSIONS

The Los Vaqueros project has provided an extraordinary opportunity to compare robust seed assemblages from five component areas spanning about 9,500 years of central California prehistory. The assemblages are all profoundly different in ways that seem to be shaped much more by behavioral than taphonomic factors.

The economy of early Holocene CCO-696 Deep appears surprisingly acorn-focused, with a significant presence of wild cucumber, smaller numbers of manzanita, and very few small seeds. This constitutes the sparest seed assemblage yet recovered from central California. It appears consistent with use restricted primarily to the immediate site locale, and perhaps with highly mobile, short-term occupation in the summer and fall.

Site CCO-637 is characterized by a more balanced assemblage of nut and berry crops than at -696 Deep. Manzanita residue is the most prevalent, followed by acorn, wild cucumber, and gray pine. The increased abundance of more distant taxa appears associated with a more extensive residential mobility strategy incorporating forays to more distant areas. As at CCO-696 Deep, the minimal use of small seed resources may indicate a seasonally restricted occupation during the summer and fall.

The assemblage from CCO-696 West is similar in many respects to -637, and probably reflects a similar residential occupation with forays to procure distant resources. Of note here, however, is the greatest use within the Los Vaqueros sequence of buckeye, the most costly nut crop. This peak may be indicative of the period of greatest resource stress in the sequence. Also noteworthy is the fourfold increase in small seeds, probably reflective of the appearance of patterned but nonintensive use of a new set of resources. The small seeds and rare *Brodiaea* bulb remains show that CCO-696 West was occupied in a fuller range of seasons than the two earlier components.

Striking increases in small seed frequency at Emergent period sites CCO-458 and -459 mark an important economic shift. Use of distant nut and berry crops declines, supplanted apparently by small seeds, a shift that shows greater emphasis on summer-ripening resources from seasonal wetlands. Nut crop use was apparently focused on acorns and bay. This economic strategy may have been more effective at eliminating resource stress than that evidenced in later CCO-696 occupations, as the costly buckeye is less common at -458 and -459.

The rich assemblage associated with the isolated bedrock mortar station at CCO-459 demonstrates that a wide variety of products were prepared in addition to acorn. The ratio of acorn to small seeds is lower than at habitation site CCO-458, and may imply that the small seeds, manzanita, and perhaps *Brodiaea* bulbs, were actually the focus of the food preparation station activities rather than acorn.

Most of the diachronic changes in seed assemblages appear to follow from the economic models of Basgall (1987; Basgall and Bouey 1991), Beaton (1991), and Wohlgemuth (1996a). These models posit the importance of population/resource imbalances and attendant increased social interaction between neighboring groups. Whatever the causes of these changes, there appears to have been a long-term, progressively more intensive occupation of a somewhat marginal locality.

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APPENDIX I

FAUNAL ANALYSIS

APPENDIX I
ANALYSIS OF FAUNAL REMAINS FROM LOS VAQUEROS PREHISTORIC SITES

Krislyn K. Taite

INTRODUCTION

Analysis of the faunal remains from six sites within the Los Vaqueros Project area has dealt primarily with defining the relationship between temporal units and faunal-resource-exploitation patterns, and interpreting these data in terms of the theory of resource intensification. Evidence of butchering patterns, intensity of bone reduction, and effects of carnivore scavenging have been used to characterize patterns of intensification. The goal of this study is to present patterns of subsistence change over the last 8,000 years in the Los Vaqueros area through the analysis of the faunal remains. This lengthy span of time incorporates all Archaic-period temporal units and later temporal periods in Fredrickson's (1994) scheme.

The Los Vaqueros faunal analysis has been conducted within the framework of the model of resource intensification, which is briefly discussed below. The discussion begins with a definition of the model and the factors necessary for intensification to take place. An outline of the temporal parameters indicates when intensification was expected to be evident in the vertebrate archaeofauna of central California. A significant aspect of this study has been the identification of the indicators of intensification in the vertebrate archaeofauna assemblages through the use of selective resource efficiency indices that demonstrate the relationship between large mammals and other resources (see discussion, below).

Probably the most quoted and concise definition of intensification is from Beaton, who described it as "the sum of additional labor and material devoted to increasing the yield of currently exploited resources within the residential estate" (1991:951).

In order to identify the significance of certain floral remains in the archaeological record, researchers suggest an examination of the types of groundstone used to process those remains (Basgall 1987; Bouey 1987). Specifically, researchers have focused on the relationship between handstone/ millingslab and processing small seeds, and mortar/pestle and acorn processing. They have noted that intensification, as shown by increasing frequencies of mortars/pestles, was evident at about 2500 B.P. in the southern North Coast Ranges (Basgall 1987:35), from approximately 4500 to 1500 B.P. in the San Francisco Bay area (Fredrickson 1973), and at about 2800 B.P. in central California (Basgall 1987:35). This argument has been upheld by other researchers who have shown that, for much of California, the exploitation of acorns and smaller-bodied animals indicates resource intensification (Jones and Hildebrandt 1995; Simons 1993). Broughton (1994a) provided some examples of this phenomenon in his study of the Sacramento Valley, where he noted an increase in small fishes in relation to large and medium-bodied mammals. He also showed that over time, sea-otter bones increased relative to the frequency of deer bones in the Emeryville shellmound (Broughton 1994b, 1995). In both of these analyses, Broughton (1994b:383) identifies the signs of intensification from the Upper Archaic to Emergent, roughly the past 3,000 years.

Broughton (1994b:373-374) defines intensification more concretely in terms of optimal foraging theory, in which increased population densities of central-place foragers probably would have had a negative effect on foraging efficiency at a particular site. Initially, human population densities would be low. In patches close to human occupation locations, high-ranked prey densities would be high. As human population density increased, the frequency of encounter rates with high-ranked prey types would decline due to depletion of prey numbers. In order to maintain caloric requirements for the expanding human population, energy was directed to either (1) improve technology to better extract those high-ranked resources, or (2) increase the emphasis on other, lower-ranked resources such that those lower-

ranked resources were more frequently exploited (Broughton 1994b). The result would have been decreased foraging efficiency leading to resource depression, which would have required increased productivity in order to maintain the demands of an increasing population.

Intensification, it is assumed, can be reflected in the inclusion of lower-ranked resources into the diet breadth, and that the ranking system is based in part on body size. It is expected that large-bodied animals would have been targeted first in resource exploitation, followed in time by smaller-bodied animals. Indicators of intensification should have been evident in the Middle Archaic period and gained in momentum through the Archaic period in central California. This pattern would have been evident as a decrease in foraging efficiency, which can be measured by selective efficiency indices.

Working under the assumption that prey body size is indicative of prey rank, fluctuations in mammal predation efficiency should be represented in the archaeological record by changes in the relative frequencies of large-, medium-, and small-bodied mammals. While the large-bodied, high-ranked animals will always be included in the diet breadth of hunter-gatherers, there should have been variation in the frequency at which smaller-bodied animals entered the diet. The comparison between large- and small-bodied game, when converted to some index such as the minimum numbers of individuals (MNI) and applied to comparably deposited material, should show a change in efficiency over time. Simply put, faunal assemblages that contain a higher frequency of high-ranked mammals to lower-ranked mammals will reflect a higher level of foraging efficiency than those assemblages dominated by lower-ranked mammals (Bayham and Broughton 1990:150; Broughton 1994a, 1994b).

The selective efficiency index (SEI) is a calculation of foraging efficiency based on the index of the contribution of large- to small-bodied prey in a diet (see Bayham and Broughton 1990:150). Broughton uses the NISP (numbers of identifiable specimens) "of several of the most abundant species whose depositional origin is anthropogenic" (1994b:377) to calculate the SEI. This quantitative index of the relative abundance of the inferred high-ranked animal to a low-ranked animal results in an index referred to in this analysis as the "large mammal index" (LMI).

Two LMIs are calculated for the Los Vaqueros assemblages, LMI1 and LMI2. LMI1 measures the index of the contribution of the large-bodied mammals to the diet relative to the small-bodied mammals and is presented as

$$\text{LARGE MAMMAL} / \Sigma\ (\text{LARGE MAMMAL} + \text{SMALL MAMMAL})$$

Similarly, LMI2 measures the index of large-bodied mammals in the diet relative to the medium-bodied mammals and is presented as

$$\text{LARGE MAMMAL} / \Sigma\ (\text{LARGE MAMMAL} + \text{MEDIUM MAMMAL})$$

Values of the indices that approach 1.0 indicate a high index of contribution of the large-bodied mammal to the diet relative to the small- or medium-bodied animal.

For both LMIs, three calculations were performed on the basis of identifiability of the faunal remains ("identifiable" at the order level, "unidentifiable," and a combination of the two). For example, the first variant of LMI1 is LMI1A, which measures the contribution of identifiable large-bodied mammals (classified under "Artiodactyla") to small-bodied mammals ("Lagomorpha" and "Rodentia"); see Methods below for a discussion of these classifications. LMI2A's medium-bodied mammals are represented by "Carnivora." Examining animals at the level of order allows for the identification of animal behavioral issues in an effort to account for patterns of faunal exploitation.

A problem with including only the identifiable material in the analysis is that the numbers tend to favor either the small animals relative to the large animals, or the large animals relative to the medium animals. Because the elements of small-bodied animals are small, they tend to remain whole, thereby increasing their identifiability relative to other body-size classes of animals. In addition, the skeletal elements from culturally deposited large- and medium-bodied animals were disarticulated and fragmented, thereby reducing their identifiability.

This problem was dealt with through the second variant, LMI1B, which measures the contribution of "unidentifiable" large-bodied mammals, referred to as "Large mammalia" in Table 1, to small-bodied mammals, referred to as "Small mammalia" in Table 1. The third variant of LMI1, LMI1B, is simply a combination of the two former classifications. While all three variants are presented and discussed below, subsistence patterns suggested by the second and third LMIs are most relevant to this study.

SAMPLE AND METHODS

The Los Vaqueros faunal assemblages were recovered from excavation units, burials, and features from six archaeological sites. The two largest sites, CCO-458/H (referred to hereafter as CCO-458) and CCO-696, have been subdivided on the basis of temporal components. The former contained two components—East and West—and the latter contained East, West, and Deep components. Only the western part of CCO-458 was sampled, while all of the faunal material was analyzed from CCO-696 and the remaining four sites: CCO-459; CCO-462/468; CCO-636; and CCO-637.

Fish, small mammal, and bird bones may be under-represented due to sampling bias. All of the excavation units were field- screened using 1/4" mesh, and the burial matrices were screened using 1/8" mesh. Fish were, nevertheless, recovered from the 1/4" screen from sites CCO-458 and CCO-459. In addition, representative samples of fish bone were recovered from column samples and features, processed using smaller mesh sizes. James Quinn identified the osteichthyes material; the author identified all of the bird and mammal remains. Vertebrate taxa identifications were made using the zooarchaeological collections housed at Chico State University, Sonoma State University, and the California Academy of Science, San Francisco.

Each piece of bone was identified to the most specific taxonomic level possible, such that "identifiable" refers to the ordinal and more specific levels (i.e., Carnivora order, Canidae family, *Canis* genus, and *Canis latrans* species). "Unidentifiable" refers to animal classes (fish, bird, and mammal), with divisions of mammal based on size (i.e., Small mammal, Large mammal).

Where possible, each specimen was identified as to anatomical element, condition, size, side, age/fusion, and percentage of completeness. Other cultural or natural modifications noted included the presence of surface weathering, rodent gnawing, carnivore chewing, and degree of burning.

Finally, all of the material was quantified using numbers of identifiable specimens (NISP) and/or minimum numbers of individuals (MNI), as appropriate. The primary method of quantification is the calculation of the NISP, which is derived from the summation of the total number of skeletal elements assigned to each animal taxa. A secondary method involves calculating the MNI, which is derived from counting the most abundant skeletal element(s) of each species at each site/component. In an effort to better address the composition of the faunal assemblages, the family-level classification is incorporated into the MNI tabulations.

LOS VAQUEROS FAUNAL ASSEMBLAGE

The Lower Archaic (8000 to 5000 B.P.) and the Middle Archaic (5000 to 2500 B.P.) were represented by one site/component each: the former by CCO-696 Deep, which contained 108 items of animal bone; and the latter by CCO-637, with 691 faunal items. The Upper Archaic (2500 to 950 B.P.) was represented by four sites/components: CCO-696 West, with 2,834 pieces of bone; CCO-636, with 35; CCO-696 East, with 504; and CCO-458 East, with 261 faunal specimens, for a total of 3,634 pieces of animal bone. The Lower Emergent (about 950 to 450 B.P.) was found at two sites/components: CCO-458 West and CCO-459, for the greatest quantity of faunal material in the project: 10,391 pieces of animal bone. Finally, the Upper Emergent (from about 450 to 200 B.P.) is represented by CCO-462/468, from which 144 bones were recovered.

The results of both quantification methods (NISP and MNI) are presented in Table 1. From those elements identifiable to family, genus, and/or species, there are a total of 33 animal taxa represented:

10 fish (NISP = 69), 1 amphibian, 3 reptile (NISP = 38), 5 bird (NISP = 18), and 15 mammal taxa (NISP = 2,292), for a total of 2,387 "identifiable" bones from at least 236 individuals.

Mammals contributed 94.8% of the total number of identified skeletal elements for the project. Ground squirrel bones (*Spermophilus beecheyi*) dominated with 299 skeletal elements and an MNI of 48. Bones of the pocket gopher (*Thomomys bottae*) were the next most abundant with 81 elements from at least 35 individuals. At the order level, Rodentia comprised the third largest group of mammal bones with 627 skeletal elements from 23 individuals, and Artiodactyla was the next most common with 930 elements from 11 individuals.

Class Reptilia was represented by western pond turtle (*Clemmys marmorata*; NISP = 17) and snake (Colubridae family; NISP = 18) remains. Birds were represented by 18 identifiable skeletal elements. Only 7 skeletal elements of birds were identified to species, all red-tailed hawk (*Buteo jamaicensis*; MNI = 3). Classifications at the family level indicated that species of bitterns (Ardeidae), ducks/geese (Anatidae), hawks/eagles (Accipitridae), and songbirds (Passeriformes) were also present at the sites, representing a total of 8 individuals. The least represented class of animals was Amphibia, as there was a single identifiable frog bone observed.

Due to problems with the fragmentary nature and small size of fish bones, fish were not commonly recovered from screens in the field at all sites/locations. Fish remains were recovered, however, from an excavation unit at CCO-458 West under similar conditions as that of the rest of the animal bone, thereby enabling their inclusion. Discussion of the identifiable fish species as seasonal indicators continues below and includes fish bone recovered from flotation and column samples.

At CCO-458, Sacramento perch (*Archoplites interruptus)* is the best represented species, with an NISP of 26, while the next most common fish, white sturgeon (*Acispenser transmontanus*), has an NISP of 10. Correlation between frequencies of fish to other animal classes was precluded by lack of comparable data.

Although considerable in number (n = 2,387), the bone identifiable to species, genus, family, or order constitute a mere 15.9% of the total faunal assemblages combined. In order to make more meaningful comparisons, the remaining 84.1% (n = 12,581) that was not identifiable to order or below was relegated to the level of class of animal (i.e., Aves and Mammalia), and referred to here as "unidentifiable."

Assuming that the species represented in the "unidentifiable" class are also composed of those "identifiable" species listed in Table 1, and that the separate "identifiable" species can be subsumed into a general class-level organization (i.e., *Buteo jamaicensis* in the Aves group), then a better sense of the frequencies of classes of animals is attained. Mammals dominate the assemblages relative to other classes of animals to such an extent that their lowest frequency was 97.84 for the Lower Emergent-period assemblage.

SEASONALITY OF EXPLOITATION

The presence of certain fish and waterfowl species in the vertebrate archaeofauna indicate seasonal use of sites/components. In addition, identifiable Artiodactyla remains with presence or absence of diaphyseal fusion suggest season of exploitation.

Analysis of the fish remains was geared toward identifying the variety of fish species present throughout time. Fish remains were recovered from six contexts: a flotation sample from CCO-637; a flotation and a microsample from CCO-696 West; a column sample from CCO-458; an excavation unit from CCO-458 West; and an excavation unit from CCO-459.

Given the high degree of similarity between skeletal elements from the different species, most of the fish remains were identifiable to the family level of Cyprinidae (35.3%), with 60.2% of the fish assemblage identifiable to the species level. Table 1 presents the NISP and MNI of the fish species in relation to sites/components. Analysis of the fish bone lends itself to two interrelated issues: site location in relation to past hydrologic topography and seasonality of exploitation.

Fish habitat and seasonal migration data were compiled from a number of researchers (Page and Burr 1991; McGinnis 1984; and Moyle 1976). The classification of preferred habitats of the identifiable fish species includes "lake," "stream," "ocean," and "bay/delta." Based on the habitats suggested by the presence of the fish species, it can be inferred that the occupants of CCO-637 and CCO-696 had access to a lake, while the occupants of CCO-458 East and CCO-458 West had access to a lake/stream, and those of CCO-459 had access to a stream. The "lakes" may have been simply pools formed after rains, or deep, slow-water areas in streams, rather than true lakes. Conversely, since the distributions also describe a temporal sequence, perhaps these data indicate a wetter period from the Middle Archaic through the Upper Archaic. After that time, a warming trend may have reduced the pondage or another change may have increased stream flow.

In Table 2, the relationship between the habitat, season, and spawning location of the identifiable fish species is presented. On the basis of the inclusion of species that were present only during seasonal migrations, CCO-637 and CCO-696 were probably occupied from spring to mid-summer, CCO-458 occupied from spring to summer, CCO-458 West from spring to fall, and CCO-459 during either the spring or fall.

Other animal indicators of seasonality in the faunal assemblages include the presence of migratory species of waterfowl and the degree of fusion of Artiodactyla skeletal elements. Duck and geese populations fluctuated seasonally, and thus their bones might have been useful indicators; however, the only waterfowl bone identifiable as to family, genus, or species was a single element from the family-level classification of Anatidae from CCO-458 West.

Artiodactyla were represented by tule elk, black-tailed deer, and pronghorn for a total of 21 items from seven sites/components with remains having observable diaphyses. The component with the highest number of specimens was CCO-458 West (n = 10), consistent with the overall amount of faunal material recovered from this location. The poor sample size indicates that the Artiodactyla cannot be relied on to shed light on the question of seasonality.

TAPHONOMY

Butchering Patterns: Cut Marks And Fragmentation

Because resource intensification is indicated by a decrease in foraging efficiency, and as resource depression affects populations of those high-ranked animals, then there should be more intensive processing of carcasses of high-ranked animals. Certain types of Artiodactyla (i.e., deer, elk, pronghorn) carcass processing should be apparent, including bone fragmentation for marrow extraction, bone grease extraction, and cut-mark patterning. Researchers have analyzed cut marks on artiodactyl bones to identify patterns of butchering and processing of large mammals (Binford 1981; Lyman 1987). These analyses can permit a number of inferences regarding site function, distance between kill location and site location, and preference for certain anatomical parts.

Cut marks on Artiodactyla remains in the vertebrate archaeofaunal assemblages at Los Vaqueros are scarce: only 22 items exhibit cut marks. The only "identifiable" example was one proximal end of a metatarsal identified as Artiodactyla from CCO-458 West. The remainder consisted of "unidentifiable" bone, all from "large mammal": one scapula fragment, one flat-bone fragment, and 19 longbone fragments.

Cut bone distribution followed the frequency of all other bone. CCO-458 West contained 66.7% (17 items) of the items with cut marks, which is consistent with expectations given that this location contains 62.7% of the total archaeofaunal material analyzed for this project. Fifteen pieces of large mammal longbone fragments, one piece of flat bone, and the Artiodactyla metatarsal mentioned above were recovered from this component. Cut marks were observed minimally on five specimens from four other components. CCO-696 Deep had one medial fragment of a large mammal right scapula with several butchering cut marks, especially on the lateral side at the base of the glenoid fossa. CCO-696 West contained one large mammal longbone fragment. CCO-459 contained two large mammal longbone fragments, and CCO-462/468 had a single fragment of large mammal longbone with butchering marks.

The temporal distribution of cut bone also followed sample size. The Lower Archaic, Upper Archaic, and the Upper Emergent periods each had one specimen. The Lower Emergent period contained most of the cut bone, with 19 items.

Given the minimal numbers of cut marks, either butchering was not common or indicators of butchering were often not evident on the bone. The lack of bones with cut marks could indicate that (1) there was no need to transport as much of the carcass as possible back to camp; (2) the hunting party could only transport a limited quantity of the highest-ranked part of the carcass (the meat stripped from the bone), probably due to distance from camp, thereby eliminating bone in general; or (3) once transported back to camp, the bone was intensively processed, thereby diminishing the visibility of cut marks and reducing the chances of bone identification.

The first alternative would have occurred only if artiodactyls were limitless and encounter rates were astronomically high, which was probably not the case given the pattern of resource depression indicated by other lines of evidence (i.e., frequency of medium mammals, degree of carnivore chewing) discussed below. The second alternative should have produced higher frequencies of higher-ranked skeletal elements.

The third alternative works best given the fragmentary character of the vertebrate archaeofaunal assemblages. Intensive processing would have destroyed much of the bone by breaking down the longbone shafts for marrow extraction and smashing the articular ends for bone-grease removal. Processing bone in this manner would have resulted in small, fragmentary pieces of longbone shaft and cancellous bone lacking distinguishing characteristics. Further, bones subsumed under the class-level grouping of "unidentifiable" lacked discriminate landscapes, thereby precluding them from classification at the order, or lower, level. Thus, it is hypothesized that assemblages characterized by high frequencies of "unidentifiable" relative to "identifiable" mammal bone underwent intensive bone processing.

In relation to the "identifiable" bone, the frequency of "unidentifiable" bone, even in the Lower Archaic, was modest (66.6%) but clearly increased in the Middle Archaic (88.4%). This frequency stabilized through the Upper Archaic (83.1%) and Lower Emergent (84.1%) but increased in the Upper Emergent (95.0%). For all periods, the frequency of "unidentifiable" bone was high, thereby suggesting a level of bone processing regarded as commensurate with decreased foraging efficiency.

CARNIVORE CHEWING

Only eight elements exhibited carnivore chewing. Four were identifiable to species, including one *Odocoileus hemionus* complete left astragalus, one *Canis* sp. right medial mandible, one artiodactyl antler fragment, and one possible *Cervus elaphus* proximal left ulna. The remaining four items were longbone fragments from the "Large mammal" category.

The chewed bones were widely distributed. Two items were from CCO-696 West, three from CCO-696 East, two from CCO-458 West, and one from CCO-459. Other than CCO-696 West, which yielded radiocarbon dates from 2670 to 1450 B.P., most of the carnivore chewing was evident in components dating from about 1500 to 400 B.P. (Lower Emergent).

Carnivore chewing appears to have been a phenomenon restricted to a tight time span, as it was observed only in the Upper Archaic and Lower Emergent, cumulatively dated from about 2765 to 465 cal B.P. These data suggest a relationship between evidence for carnivore chewing and decreased foraging efficiency (especially the increased frequency of medium-bodied mammals; see discussion below).

SUBSISTENCE

Now that the general character of the faunal assemblages has been presented, issues of prehistoric prey choice can be examined more closely. First, however, three caveats that deal with the elimination of certain unnecessary data from further analysis must be introduced. The analysis (1) focuses strictly on the class Mammalia; (2) eliminates certain intrusive, historic, or non-sizeable mammal bone from

further consideration; and (3) divides class mammalian specimens into body-size groupings. These choices were made because other classes of animals are not well-represented: mammals compose 94.8% of the combined faunal assemblages. This dominance is the result of a combination of factors, including field methods, small size of bone for the under-represented classes (fish, birds, reptiles, amphibians), and the effects of postdepositional processes.

Secondly, in order to direct attention to archaeofaunas most likely to represent economically significant mammals, certain groups of mammals were removed from further analysis. Intrusive rodents (*Thomomys bottae, Scapanus latimanus, Dipodomys* sp.) were eliminated due to the fossorial nature of the animals, and the consequent difficulty determining whether their presence in the faunal assemblage was due to natural or cultural actions. Historically introduced cattle (*Bos taurus*) were removed because these data are irrelevant to the issue of prehistoric resource exploitation. The result is the inclusion of animals that were present in the area prehistorically and that occurred in the sites probably as the result of cultural action rather than natural events. Also removed due to lack of discriminating body-size information were bones classified as "Mammalia, indeterminate size." Cumulatively, the removal of these three groups of bone (n = 588), resulted in a total analyzable collection consisting of 14,380 pieces of bone.

The remaining mammals are divided into "large," "medium," and "small" body size on the basis of comparison to the identifiable animals from the faunal assemblages. Consequently, the classification of "small mammal" represents rabbits, hares, and squirrels, "medium mammal" refers to dog/coyote and badger (in addition to other carnivores including fox, raccoon, and skunk), and "large mammal" represents the elk, black-tailed deer, and pronghorn. In general, "small" refers to rodents, "medium" refers to carnivores, and "large" refers to artiodactyls.

Results for all of the faunal assemblages combined indicate that large mammals made up the majority, with 46.7%; medium mammals followed with 33.6%; and small, with 19.7%. While interesting in itself, more significant to this analysis is how the relationship between the three sizes of mammals varied over the five temporal periods.

Figure 1 shows the relationship between the size classes of the economically significant identifiable and unidentifiable mammals combined. Small mammals dominated the Lower Archaic faunal assemblage. During the Middle Archaic, large mammals gained in relative frequency. The Upper Archaic was different in that the large and medium mammals were observed in the faunal record at almost equal frequencies. Finally, by the Lower Emergent, frequencies of large mammals were on the rise, a pattern that reached its height during the Upper Emergent. This method of examination allows for cross-temporal comparisons of foraging efficiency, further substantiated by selective resource efficiency indices, discussed below.

Prehistoric hunter-gatherers from the Paleoindian period are expected to have initially focused on high-ranked animals, while indications of intensification in the archaeological record are not expected to have occurred before about 2800 B.P. in central California. Thus, the pattern of foraging efficiency should show that large mammals were heavily exploited first, then smaller mammals were gradually added into the diet over time.

In order to test this hypothesis, two selective efficiency indices were calculated to determine the actual degree of foraging efficiency for each time period: large-bodied mammals to small-bodied mammals, LMI1; and large-bodied mammals to medium-bodied mammals, LMI2. Identification of the type of site represented by each site/component is inherent to this calculation. As such, residential sites are targeted as they contain refuse deposits accumulated throughout the occupation of the location. Table 3 shows each site or component by site type, as either "residential" or "non-residential," in accordance with the component assemblage discussions in Chapter 10. The non-residential sites are eliminated from further discussion of the archaeofaunal assemblages.

The first LMI should reflect high predation foraging efficiency with a high frequency of large-bodied mammals in relation to small-bodied mammals for the Lower Archaic period, decreasing gradually as resource depression became increasingly pervasive in the archaeological record. When

calculated for each period, however, the frequency of large-bodied mammals relative to small-bodied mammals actually increased from the Lower Archaic through the Upper Archaic periods (Figure 2), a pattern converse to expectations given the model of intensification. Of interest is the extremely low predation efficiency (LMI1 = 0.34) of the earliest component (represented by CCO-696 Deep), one of the oldest components in the region (8000 to 6500 B.P.). The frequency of small mammals at this location is converse to expectations about Paleoindian "big-game hunters."

An examination of the CCO-696 Deep sample indicated that there were only 108 pieces of bone representing three species, three orders, and two classes of animals. Although dominated by burnt *Spermophilus beecheyi* remains, the MNI for that species was one. The other identifiable species included *Canis* sp. and *Cervus elaphus*, both with MNIs of one. The size of the faunal assemblage is too small to be of any use.

Testing the relationship between large to small mammals is perhaps premature, as optimal foraging theory indicates that the next lower-ranked resource would be included in the diet breadth following a decline in population densities of the high-ranked resource. As such, the relationship between the contribution of large- to medium-bodied mammals is examined by the second selective efficiency index, or LMI2. The LMI2A is high relative to the other two LMIs for this data set. This is probably due to the high degree of fragmentation and is reflected in the low identifiability level (0.09%). The other two LMIs are more reliable indicators of exploitation patterns at the general level.

There was a definite decrease in the frequency of large-bodied mammals relative to medium-bodied mammals from the Lower through the Upper Archaic, 8000- 950 B.P. (Figure 3). Intensification, as shown by the increased frequency of medium-bodied mammals, was well underway at this time. The LMI2 for the Lower Emergent period (950 to 450 B.P.), however, changed to reflect an increase in the frequency of large-bodied mammals relative to medium-bodied mammals, and thus an inferred increase in foraging efficiency.

In order to relate the mammal body-size inferences to animal behavior, the scope of the body-size-based analysis returns to those animals identified within the size-range divisions. As noted above, the large-bodied mammals from the identifiable faunal material were primarily artiodactyls: deer, pronghorn, and elk. Medium-bodied mammals consisted of carnivores—dog/coyote and badger—as identified in the faunal assemblages, but probably also fox, raccoon, and skunk.

These medium-sized mammals are known to be disruptive and intrusive animals that feed on procured and scavenged animal remains. Given a situation in which human settlement has occurred at a particular location over a number of years, and to the extent that discrete locations of household and food-debris accumulations are regular and established in close proximity to the settlement location, then it is expected that certain animals would exploit this resource. Scavenging animals tend to fit the medium-sized mammal classification (raccoon, coyote, skunk). The result might be an increasingly regularized presence of these medium-sized scavenging mammals close to the occupation site, thereby making them a readily available economic resource.

Given these expectations, the frequency of medium-sized mammals is expected to co-vary with other indicators of residentiality. Thus numbers of carnivores, as expressed by the frequency of medium-sized mammals, are compared between sites/components whose features are indicative of long-term occupation sites and sites/components with other, non-residential functions.

DISCUSSION

On the basis of body-size classifications, the LMI2 was used to identify the relationship between large- and medium-bodied mammals for the residential sites/components. Results indicate an increased use of medium-bodied mammals over time for all three of the Archaic periods, then a decrease in medium-bodied mammals in the Upper Archaic period. The medium-bodied mammals were represented by carnivores who are opportunistic omnivores, consuming vegetal matter, small animals, and anything else that can be scavenged, including carrion. They would probably have been attracted to prehistoric refuse deposits, which were a common element of residential sites. Except for CCO-696 Deep, all of

sites/components classified as residential sites yielded an LMI2C value of 0.62 or less, while non-residential sites yielded an LMI2C of 0.65 or more.

The former pattern of relatively low LMI2C values with residential sites is probably the result of scavenger exploitation and carnivore utilization in the vicinity of residential sites, commonly referred to as a predator–prey "feedback loop" (Odum 1971:34). In such a model the scavengers and the human occupants provide both positive and negative feedback: the humans contribute to maintaining refuse areas where carnivores could be readily procured by the occupants with traps and snares. The exploitation of medium-bodied mammals reflects intensification through decreased foraging efficiency.

The latter pattern of LMI2C values of 0.65 or greater with non-residential sites suggests increased foraging efficiency. While this pattern appears to be converse to expectations of intensification, it is possibly the result of specialized artiodactyl hunting or processing locations. Perhaps social organization reached a level of development that allowed for the exploitation of high-ranked resources through the incorporation of group hunting activities manifested in these possible hunting blinds/camps.

SUMMARY

In summation, analysis of the vertebrate archaeofauna from the Los Vaqueros Project reveals that:

- Mammals dominated the assemblage, with 94.8% of the identifiable bone in general.

- Due to the high proportion of intact elements necessary for proper identification, rodents—especially *Spermophilus beecheyi* and *Thomomys bottae*—constituted the most identifiable species of mammals.

- The small size of the faunal assemblage from CCO-696 Deep (n = 108; total MNI = 3) reduces the reliability of that sample.

- Indicators of seasonality were sparse at best, but the fish data suggest potential seasonal use of components: from early spring to fall.

- In general, 84.1% of the bone was unidentifiable and highly fragmentary, suggesting a high rate of bone processing or post-depositional destruction.

- Signs of modification, either cultural (cut marks) or natural (carnivore chewing), were rare probably as the result of intensive processing of artiodactyl carcasses.

- Carnivore chewing was evident at sites/components from the past 2,500 years: from the Upper Archaic (CCO-696 West and CCO-696 East), to the Lower Emergent (CCO-458 West and CCO-459). It was most common in the Lower Emergent component of CCO-458 West.

- The LMI1C of large-bodied to small-bodied mammals was low to begin with in the Lower Archaic, but increased through the Upper Archaic. The Lower Emergent showed a slight decline in the contribution of large-bodied mammals to the diet relative to small-bodied mammals.

- The LMI2C showing the contribution of large-bodied mammals relative to medium-bodied mammals in the diet was relatively high in the Lower Archaic period, then decreased from the Lower Archaic to the Upper Archaic periods. It increased during the Lower Emergent period.

- As a group, residential sites had lower frequencies of large mammals relative to medium mammals.

CONCLUSION

Despite the large number of vertebrate archaeofauna recovered from the Los Vaqueros Project area (n = 14,968), there was a relatively small amount of bone identifiable to species-level classification (15.9%). This led to two different sets of examinations: the relationship between "unidentifiable" and "identifiable" bone, and comparison of the relative frequencies of the three body-size groupings of mammals. Comparisons between the "unidentifiable" and "identifiable" remains indicate that there was a high degree of bone processing at all sites/ components, which suggests a decline in predator foraging efficiency over time.

A scheme based on body-size divisions of mammals incorporated both the "identifiable" and the "unidentifiable" remains, which allowed for analysis of predator foraging efficiency. These calculations indicated that there was a decline in foraging efficiency over time to the extent that diminishing populations of large-bodied mammals necessitated the exploitation of lower-ranked, smaller-bodied mammals. Medium-bodied mammals were increasingly exploited into the Upper Archaic period, a pattern consistent with resource intensification. After that time, the increased frequency of large-bodied mammals from about 950 to 450 B.P. suggests the use of non-residential sites and major changes in social organization (e.g., massive hunting drives), technology, or trade relationships.

Notably, the CCO-696 West archaeofauna is composed primarily of medium-bodied mammals (44.8%), followed closely by large-bodied mammals (39.2%). Small mammals are minimally represented (15.9%). At component CCO-458 West, the data are not as resolute, but medium-bodied mammals still formed a considerable portion of the diet (32.6%). Large mammals are represented by 49.3% and small mammals by 18.0%. These data are consistent with the hypothesis, and further support the relationship between long-term occupation locations and the exploitation of medium-bodied mammals (carnivores).

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TABLE 1: NISP AND MNI OF ALL TAXA FROM EXCAVATION UNITS AT LOS VAQUEROS BY SITE/COMPONENT AND TIME PERIOD

Period/Stage	Lower Archaic		Middle Archaic		Upper Archaic								Lower Emergent				Upper Emergent			
years BP	8000-5000		5000-2500		2500-950								950-450				450-150			
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
Site/Component	696D	696D	637	637	696W	696W	636	636	696E	696E	458E	458E	458W	458W	459	459	462/46	462/468	**TOTAL**	**TOTAL**
Embiotocidae													2	1					**2**	**1**
Oncorhynchus sp.													1	1					**1**	**1**
Acipenser transmontanus													10	1					**10**	**1**
Catostomus occidentalis													4	1					**4**	**1**
Lavinia exilicauda													6	1					**6**	**1**
Mylopharodon conocephalus													2	1					**2**	**1**
Orthodon microlepidotus													3	2					**3**	**2**
Pogonichtys macrolepidotus													3	2					**3**	**2**
Ptychocheilus grandis													6	1					**6**	**1**
Cyprinidae													6	1					**6**	**1**
Archoplites interruptus													26	1					**26**	**1**
Osteichthyes													**69**	**13**					**69**	**13**
Anura	0		0		0		0		0		0		0	0	1	1	0		**1**	**1**
Amphibia	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**1**	**1**
Clemmys marmorata	0		2	1	8	1	0		1	1	0		5	2	1	1	0		**17**	**6**
Iguanidae	0		0		0		0		0		0		1	1	0		0		**1**	**1**
Crotalus sp. (rattlers)	0		0		0		0		0		0		0	0	1	1	0		**1**	**1**
Colubridae	0		1	1	3	1	0		2	1	0		12	2	0		0		**18**	**5**
Reptilia	**0**	**0**	**3**	**2**	**11**	**2**	**0**	**0**	**3**	**2**	**0**	**0**	**18**	**5**	**2**	**2**	**0**	**0**	**37**	**13**
Ardeidae (herons, bitterns, egrets)	0		0		0		0		0		0		1	1	0		0		**1**	**1**
Anatidae (ducks and geese)	0		0		0		0		0		0		1	1	0		0		**1**	**1**
Accipitridae (hawks and eagles)	0		0		4	1	0		0		0		4	1	0		0		**8**	**2**
Buteo jamaicensis	0		0		3	1	0		1	1	0		3	1	0		0		**7**	**3**
Passeriformes	0		0		0		0		1	1	0		0	0	0		0		**1**	**1**
Aves	**0**	**0**	**0**	**0**	**7**	**2**	**0**	**0**	**2**	**2**	**0**	**0**	**9**	**4**	**0**	**0**	**0**	**0**	**18**	**8**
Scapanus latimanus	0		1	1	1	1	0		0		0		1	1	0		0		**3**	**3**
Insectivore	**0**	**0**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**3**	**3**
Leporidae	0		0		0		0		0		0		8	2	0		0		**8**	**2**
Lepus californicus	0		0		5	1	0		0		0		0	0	1	1	0		**6**	**2**
Sylvilagus sp.	0		3	2	3		0		2	1	1	1	8	3	4	2	0		**21**	**9**
Sylvilagus audobonii	0		0		4	2	0		0		0		1	1	0		0		**5**	**3**
Lagomorpha	**0**	**0**	**3**	**3**	**12**	**4**	**0**	**0**	**2**	**1**	**1**	**1**	**17**	**7**	**5**	**3**	**0**	**0**	**40**	**19**
Rodentia	10	1	2	1	34	2	0		24	2	8	1	547	15	2	1	0		**627**	**23**
Sciuridae	0		0		37	8	0		8	1	0		81	9	0		0		**126**	**18**
Spermophilus beecheyi	20	1	26	12	51	3	0		1	1	9	2	142	14	50	15	0		**299**	**48**
Thomomys sp.	0		0		9		0		22	4	0		22	3	0		0		**53**	**7**
Thomomys bottae	0		4	3	29	7	0		2	5	26	9	10	4	9	6	1	1	**81**	**35**
Dipodomys sp.	0		0		0		0		0		0		3	1	0		0		**3**	**1**
Castor canadensis	0		0		0		0		0		0		1	1	0		0		**1**	**1**
Rodentia	**30**	**2**	**32**	**16**	**160**	**20**	**0**	**0**	**57**	**13**	**43**	**12**	**806**	**47**	**61**	**22**	**1**	**1**	**1190**	**133**
Carnivora	1	1	2	1	3	1	0		0		0		20	3	1	1	2	1	**29**	**8**
Ursus arctos	0		0		0		0		1	1	0		0	0	0		0		**1**	**1**
Taxidea taxus	0		0		1	1	0		0		0		1	1	0		0		**2**	**2**
Canis latrans	1	1	0		13	2	0		0		0		3	1	0		0		**17**	**4**
Carnivora	**2**	**2**	**2**	**1**	**17**	**4**	**0**	**0**	**1**	**1**	**0**	**0**	**24**	**5**	**1**	**1**	**2**	**1**	**49**	**15**
Artiodactyla	3	1	34	2	244	1	0		35	1	3	1	595	4	16	1	0		**930**	**11**
Cervus elaphus	1	1	1	1	1	1	0		0		0		6	1	1	1	0		**10**	**5**
Odocoileus hemionus	0		1	1	6	2	0		3	1	0		7	1	1	1	2	1	**20**	**7**
Antilocapra americana	0		3	2	3	1	0		0		0		11	3	1	1	0		**18**	**7**
Bos taurus	0		0		0		0		0		0		0	0	0		2	1	**2**	**1**
Artiodactyla	**4**	**2**	**39**	**6**	**254**	**5**	**0**	**0**	**38**	**2**	**3**	**1**	**619**	**9**	**19**	**4**	**4**	**2**	**980**	**31**
Identifiable subtotal	36	6	80	28	462	37	0	0	103	21	47	14	1563	90	89	33	7	4	2387	236

TABLE 1 (cont'd): NISP AND MNI OF ALL TAXA FROM EXCAVATION UNITS AT LOS VAQUEROS BY SITE/COMPONENT AND TIME PERIOD

Period/Stage	**Lower Archaic**		**Middle Archaic**		**Upper Archaic**								**Lower Emergent**				**Upper Emergent**			
years BP	8000-5000		5000-2500		2500-950								950-450				450-150			
	NISP		NISP		NISP		NISP		NISP		NISP		NISP		NISP		NISP		**NISP**	
Site/Component	696D	696D	637	637	696W	696W	636	636	696E	696E	458E	458E	458W	458W	459	459	462/46	462/468	**TOTAL**	**TOTAL**
Osteichthys	0		0		0		0		0		0		0		0		0		**0**	
Amphibia/Reptilia	0		1		0		0		0		0		0		0		0		**1**	
Aves	2		2		19		0		1		1		123		2		0		**150**	
Mammalia indeterminate	0		0		8		0		0		0		162		0		0		**170**	
Small mammalia	34		109		305		3		80		83		835		285		7		**1741**	
Medium mammalia	7		217		1216		10		141		51		2911		218		11		**4782**	
Large mammalia	29		282		824		22		179		79		3818		385		119		**5737**	
Unidentifiable subtotal	**72**		**611**		**2372**		**35**		**401**		**214**		**7849**		**890**		**137**		**12581**	
Total	**108**		**691**		**2834**		**35**		**504**		**261**		**9412**		**979**		**144**		**14968**	

Table 2: Season and Habitat of Fish Species Represented at Los Vaqueros Sites/Components

SPECIES	COMMON	HABITAT	SPAWN	WHEN
Archoplites interruptus	Sacramento perch	**LAKE**	STREAM	MIDSUM
Orothodon microlepidotus	Sacramento blackfish	**LAKE**	LAKE	LSPRING
Lavinia exilicauda	hitch	**LAKE**	STREAM	SPRING
Pogonichthys macrolepidotus	splittail	**LAKE**	STREAM	SPRING
Ptychocheilus grandis	Sacramento squawfish	**STR/LAKE**	STREAM	SPRING
Catostomus occidentalis	Sacramento sucker	**STREAM**	STREAM	ESPRING
Mylopharodon conocephalus	hardhead	**STREAM**	STREAM	SPRING
Embiotocidae	tule perch	**STREAM**	STREAM	MIDSUM
Oncorhynchus sp.	salmon/steelhead	**OCN/STR**	STREAM	SPR/FL
Acipenser transmontanus	white sturgeon	**B/DLTA**	B/DLTA	SPR/FL

Table 3: Site Type per Site/Component at Los Vaqueros

SITE/COMPONENT	SPAN (cal B.P. or ~)	LM12C	SITE TYPE
CCO-696 W	2765 – 1320	0.47	RES
CCO-637	4770 – 2585	0.59	RES
CCO-696 E	~1400 – 900	0.6	RES
CCO-458 W	~1500 – 400	0.6	RES
CCO-458 E	~1400 – 900	0.62	RES
CCO-459	1265 – 605	0.65	NON-RES
CCO-636	1540	0.69	NON-RES
CCO-462/468	~ 400 – 150	0.79	NON-RES
CCO-696 D	9870 – 7406	0.79	RES

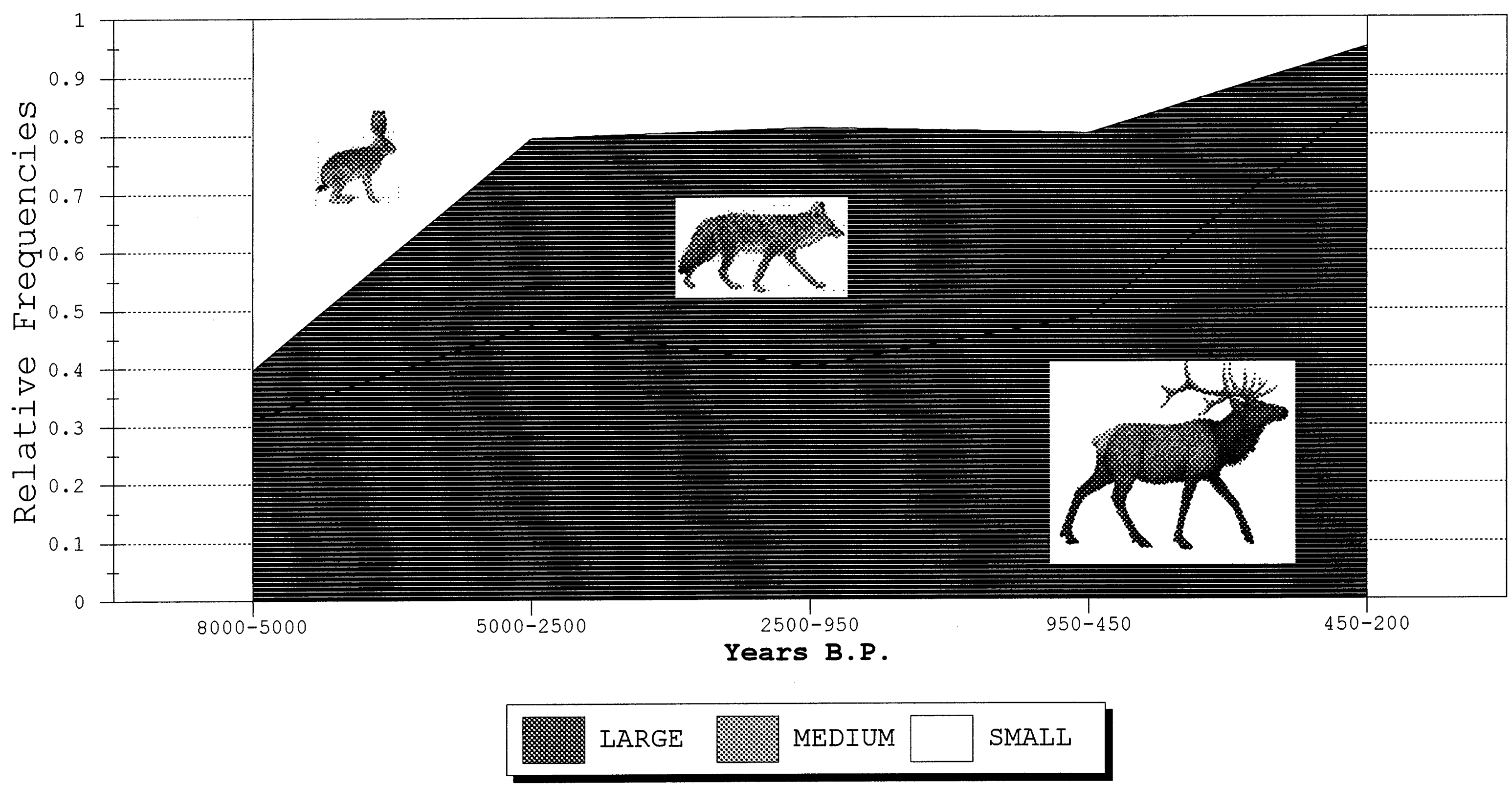

Figure 1: Relative Frequencies of Mammals Ranked by Body Size Over Time, Los Vaqueros Archaeological Project

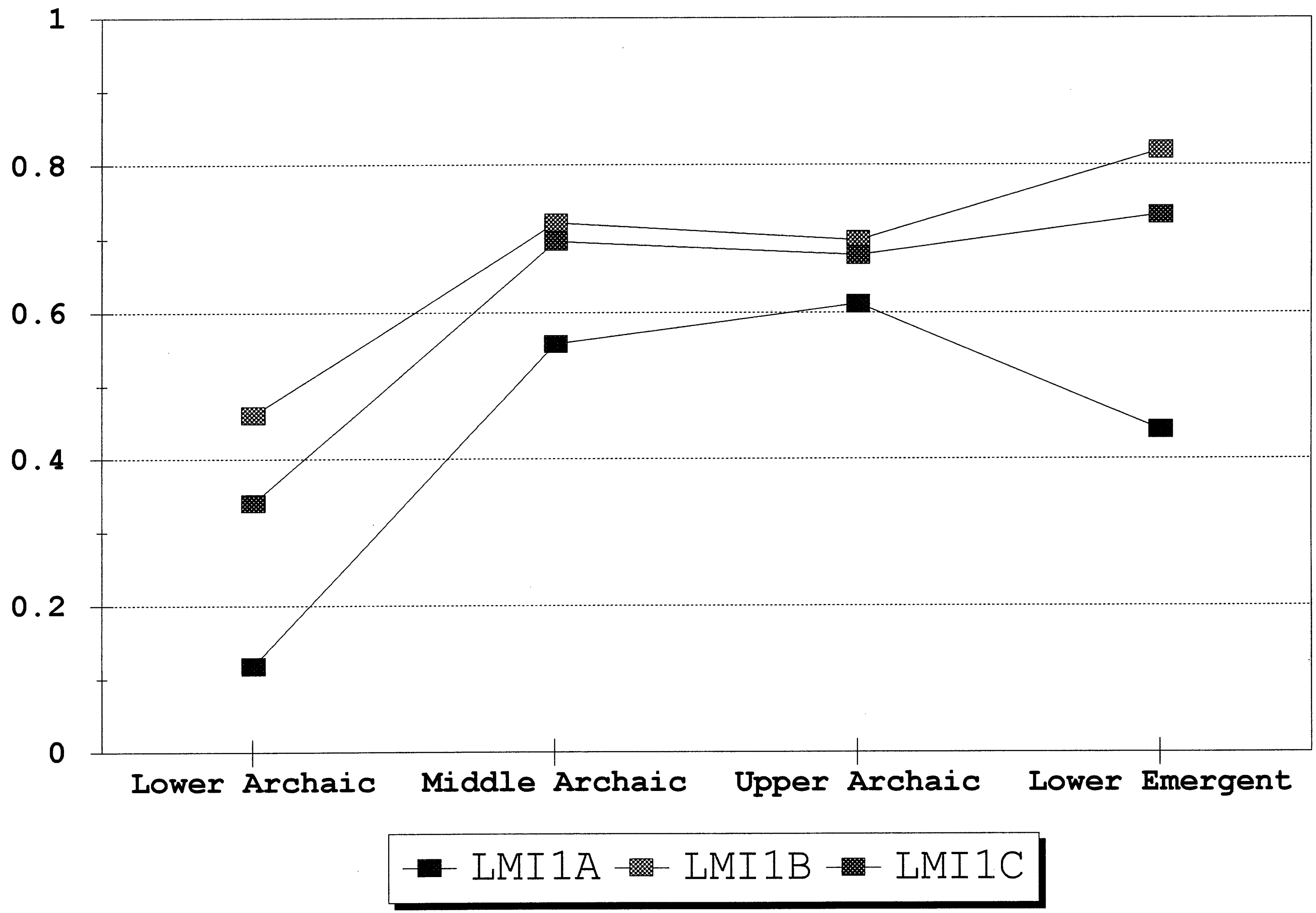

Figure 2: LMI1A-C
Los Vaqueros Archaeological Project

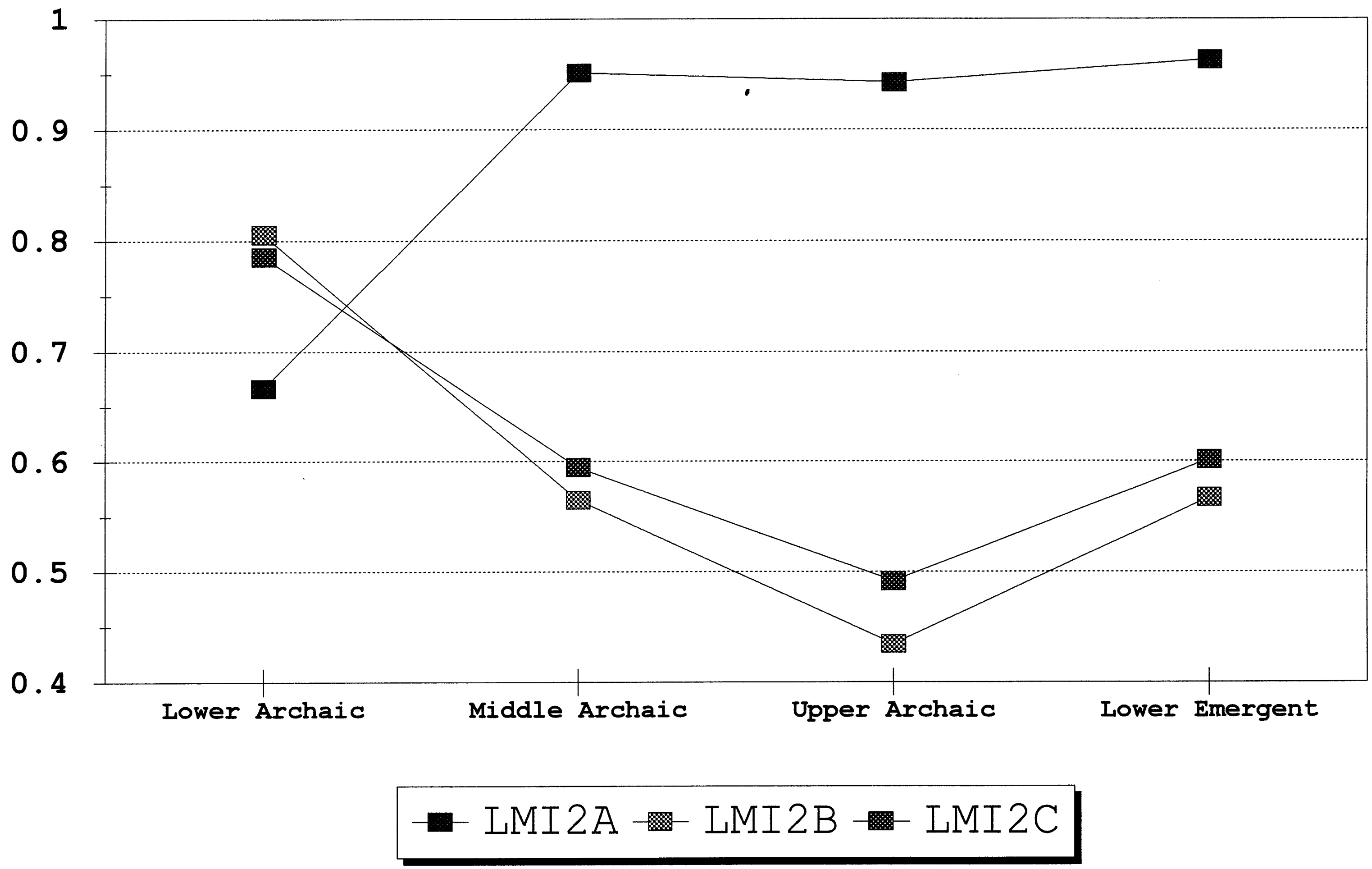

Figure 3: LMI2A-C
Los Vaqueros Archaeological Project

APPENDIX J

FISH REMAINS

ANTHROPOLOGICAL STUDIES CENTER

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AN EXAMINATION OF FISH REMAINS AT SELECTED SITES FROM THE LOS VAQUEROS ARCHAEOLOGICAL PROJECT (PREHISTORIC COMPONENTS)

22 May 1997

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Anthropological Studies Center

An examination of fish remains recovered at four sites from the Los Vaqueros Archaeological Project (prehistoric component) was conducted. The sites included CA-CCO-458/H, -459, -637, and -696. The purposes of the examination were to: (1) identify recovered skeletal elements; (2) determine the genus and species assignments of the identified elements whenever possible; (3) determine the minimum numbers of individuals (MNI) and the number of identified elements per species (NISP) of assigned species; and (4) determine the presence or absence of economically important fish species at the sites.

The fish remains were sorted, bagged, and labeled by unit and level. Identifiable bones were segregated from unidentifiable specimens. The former elements were identified using comparative collections maintained by the Department of Biology, Sonoma State University, and the Department of Ichthyology, California Academy of Sciences, San Francisco. Data recorded for each identified bone included element, side of body, burned versus non-burned, count, species, and catalog number. The data are used to determine the MNI's and NISP's of each identified species. After recordation, these data were tabulated and summarized. Skeletal element counts were determined for each identified species by calculating the total number of identified skeletal elements assigned to each species. The MNI in each species was determined by counting the most abundant skeletal element(s)--the highest count representing the MNI.

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TABLE 1
SUMMARY OF FISH REMAINS RECOVERED FROM SELECTED SITES FOR THE LOS VAQUEROS PROJECT (PREHISTORIC COMPONENTS)

	CCO-458/H (Col. Sam.)		CCO-458/H (Site)		CCO-696 (Flot. Sam.)		CCO-637 (Flot. Sam.)		CCO-696 (Micro Sam.)		CCO-459 (Site)	
FISHES REPRESENTED:	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
Elasmobranchi			1	1								
Rajidae			1	1								
Hysterocarpus traskii	1	1										
Embiotocidae			9	1					1	1		
Oncorhynchus tshawytscha			1	1							1	1
Oncorhynchus sp.			2	1								
Acipenser transmontanus			39	1								
Catostomus occidentalis			9	1								
Hesperloceucus symmetricus			5	1								
Lavinia exilicauda			19	4								
Mylopharodon conocephalus	2	1	4	2								
Orothodon microlepidotus			12	5								
Pogonichthys macrolepidotus			3	2								
Ptychocheilus grandis			27	2	2	1	1	1				
Cyprinidae	104	3	83	5	15	1	23	1	8	1	1	1
Archoplites interruptus	7	1	74	3	22	1	18	2	2	1		
Unidentified			136	NA	19	1	5	1	3	1	2	1
TOTALS	114	6	425	31	58	4	47	5	14	4	4	3

TABLE 2
FISH REMAINS RECOVERED FROM CA-CCO-458/H, COLUMN SAMPLES

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
N124;W105	000-010	vertebra	*Cyprinidae*	minnow	pc/c	8	4wht;4no	FLOT 5-1/16"
N124;W105	010-020	vertebra	*Cyprinidae*	minnow	pc/c	10	no	FLOT 6-1/8"
N124;W105	010-020	vertebra	*Cyprinidae*	minnow	pc/c	6	no	FLOT 6-1/16"
N124;W105	020-030	subopercle	*Cyprinidae*	minnow	left	1	no	FLOT 6-1/8"
N124;W105	020-030	vertebra	*Cyprinidae*	minnow	pc/c	5	yes	FLOT 7-1/8"
N124;W105	020-030	vertebra	*Cyprinidae*	minnow	pc/c	6	2wht;4blk	FLOT 7-1/8"
N124;W105	020-030	pharyngeal	*Hysterocarpus traskii*	tule surfperch	lower	1	no	FLOT 7-1/8"
N124;W105	030-040	vertebra	*Cyprinidae*	minnow	pc/c	4	2blk;2no	FLOT 8-1/8"
N124;W105	030-040	vertebra	*Cyprinidae*	minnow	pc/c	3	1blk;2no	FLOT 8-1/16"
N124;W105	040-050	ctenoid scale	*Archoplites interruptus*	Sacramento perch		4	no	FLOT 9-1/8"
N124;W105	040-050	vertebra	*Cyprinidae*	minnow	pc/c	2	no	FLOT 9-1/8"
N124;W105	040-050	vertebra	*Cyprinidae*	minnow	pc/c	4	2blk;2no	FLOT 9-1/16"
N124;W105	040-050	opercle	*Mylopharodon conocephalus*	hardhead	right	1	no	FLOT 9-1/8"
N124;W105	050-060	subopercle	*Cyprinidae*	minnow	left?	1	no	FLOT 10-1/16"
N124;W105	050-060	vertebra	*Cyprinidae*	minnow	pc/c	5	3wht;2no	FLOT 10-1/8"
N124;W105	050-060	vertebra	*Cyprinidae*	minnow	pc/c	3	2blk;1no	FLOT 10-1/16"
N124;W105	060-070	ctenoid scale	*Archoplites interruptus*	Sacramento perch		3	no	FLOT 11-1/16"
N124;W105	060-070	vertebra	*Cyprinidae*	minnow	pc/c	4	2wht;2no	FLOT 11-1/16"
N124;W105	060-070	subopercle	*Cyprinidae?*	minnow	left?	1	no	FLOT 11-1/8"
N124;W105	060-070	opercle	*Mylopharodon conocephalus*	hardhead	left	1	no	FLOT 11-1/4"
N124;W105	080-090	vertebra	*Cyprinidae*	minnow	pc/c	7	no	1/16"
N124;W105	090-100	vertebra	*Cyprinidae*	minnow	pc/c	8	no	1/16"
N124;W105	090-100	vertebra	*Cyprinidae*	minnow	pc/c	5	no	1/8"
N124;W105	100-110	vertebra	*Cyprinidae*	minnow	pc/c	2	blk	1/8"
N124;W105	100-110	vertebra	*Cyprinidae*	minnow	pc/c	3	1yes;2no	1/16"
N124;W105	110-120	vertebra	*Cyprinidae*	minnow	pc/c	3	no	1/8"
N124;W105	110-120	vertebra	*Cyprinidae*	minnow	pc/c	6	no	1/16"
N124;W105	120-130	vertebra	*Cyprinidae*	minnow	pc/c	3	2blk;1no	1/8"
N124;W105	120-130	vertebra	*Cyprinidae*	minnow	pc/c	8	2blk;2no	1/16"

blk = black; wht = white
pc/c = precaudal/caudal

TABLE 3
FISH REMAINS RECOVERED FROM CA-CCO-458/H

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
FEA 1	060-090	centrum	*Archoplites interruptus*	Sacramento perch	?	1	no	95-2-2452
FEA 1	060-090	centrum	*Cyprinidae*	minnow	?	1	no	95-2-2452
N120;W105	000-010	vertebra	*Orothodon microlepidotus*	Sacramento blackfish	caudal	1	no	95-2-338
N120;W105	010-020	centrum	*Rajidae?*	skate	?	1	no	95-2-363
N120;W105	020-030	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	2	no	95-2-389
N120;W105	030-040	centrum cap	*Oncorhynchus sp.*	salmon/steelhead	?	1	no	95-2-974
N120;W105	030-040	vertebra	*unidentified*		caudal	1	no	95-2-974
N120;W106	000-010	vertebra	*unidentified*		caudal	1	no	95-2-9
N120;W106	010-020	pharyngeal	*Cyprinidae*	minnow	left?	1	no	95-2-2479
N120;W106	010-020	vertebra	*unidentified*		caudal	1	no	95-2-2479
N120;W106	020-030	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-43
N120;W106	030-040	vertebra	*Cyprinidae*	minnow	caudal	2	no	95-2-75
N120;W107	020-030	vertebra	*Cyprinidae*	minnow	caudal	4	no	95-2-546
N120;W107	020-030	vertebra	*unidentified*			1	no	95-2-546
N120;W108	010-020	vertebra	*Cyprinidae*	minnow	caudal	2	no	95-2-85
N120;W108	020-030	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	1	no	95-2-117
N120;W108	030-040	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	caudal	2	no	95-2-127
N122;W104	000-010	vertebra	*Cyprinidae*	minnow	precaudal	1	no	95-2-992
N122;W104	000-010	cranial frag	*unidentified*			2	no	95-2-992
N122;W104	010-020	vertebra	*Catostomus occidentalis?*	Sacramento sucker	precaudal	1	no	95-2-1507
N122;W104	020-030	vertebra	*Cyprinidae?*	minnow	precaudal	1	no	95-2-1527
N122;W104	030-040	vertebra	*Archoplites interruptus?*	Sacramento perch	caudal	2	no	95-2-1546
N122;W104	030-040	centrum	*unidentified*			1	no	95-2-1546
N122;W104	030-040	cranial frag	*unidentified*			1	no	95-2-1546
N122;W105	000-010	vertebra	*Archoplites interruptus*	Sacramento perch	caudal?	1	no	95-2-570
N122;W105	010-020	pharyngeal	*Cyprinidae?*	minnow	left?	1	no	95-2-599
N122;W105	020-030	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	2	no	95-2-615
N122;W105	020-030	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	precaudal	1	no	95-2-615
N122;W105	020-030	vertebra	*unidentified*			2	no	95-2-615
N122;W105	030-040	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-629

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
N122;W105	030-040	opercle	*unidentified*		?	1	no	95-2-629
N122;W105	030-040	vertebra	*unidentified*			1	no	95-2-629
N122;W105	FEA 10	hyomandibula	*Catostomus occidentalis*	Sacramento sucker	right	1	no	95-2-2478
N122;W106	020-FLR	pharyngeal	*Cyprinidae*	minnow	left	1	no	95-2-194
N122;W106	020-FLR	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	caudal	1	no	95-2-194
N122;W106	020-FLR	unidentified	*unidentified*			4	no	95-2-194
N122;W106	020-FLR	vertebra	*unidentified*			1	no	95-2-194
N122;W107	000-010	vertebra	*unidentified*			1	no	95-2-777
N122;W107	010-020	penultimate	*Archoplites interruptus*	Sacramento perch	single	1	no	95-2-797
N122;W107	010-020	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-797
N122;W107	020-030	opercle	*Cyprinidae*	minnow	?	1	no	95-2-821
N122;W107	020-030	pharyn. tooth	*Cyprinidae*	minnow	?	2	no	95-2-821
N122;W107	020-030	pharyngeal	*Lavinia exilicauda*	hitch	left	1	no	95-2-821
N122;W107	020-030	vertebra	*Lavinia exilicauda*	hitch	caudal	1	no	95-2-821
N122;W107	020-030	cranial frag	*unidentified*			1	no	95-2-821
N122;W107	020-030	unidentified	*unidentified*			2	no	95-2-821
N122;W107	020-030	vertebra	*unidentified*		precaudal	1	no	95-2-821
N122;W108	010-020	vertebra	*unidentified*		caudal	1	no	95-2-434
N122;W108	020-030	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-456
N122;W108	020-030	pharyngeal	*Ptychocheilus grandis*	Sacramento squawfish	right	1	no	95-2-456
N122;W108	020-030	cranial frag	*unidentified*			1	blk	95-2-456
N122;W108	020-030	unidentified	*unidentified*			4	no	95-2-456
N122;W108	020-030	vertebra	*unidentified*		precaudal	1	no	95-2-456
N122;W108	020-030	vertebra	*unidentified*		precaudal	1	blk	95-2-456
N122;W108	030-040	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-468
N122;W108	030-040	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	1	no	95-2-468
N122;W108	030-040	vertebra	*unidentified*		precaudal	2	no	95-2-468
N122;W110	000-010	pharyngeal	*Cyprinidae*	minnow	left	1	no	95-2-649
N122;W110	000-010	vertebra	*unidentified*		precaudal?	1	no	95-2-649
N122;W110	020-030	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-681
N122;W110	030-040	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-703
N122;W110	030-040	vertebra	*Cyprinidae*	minnow	precaudal	2	no	95-2-703
N122;W110	040-050	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	1	no	95-2-718?
N122;W110	040-050	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-718?
N122;W110	050-060	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-737
N122;W110	050-060	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-737
N122;W110	050-060	vertebra	*unidentified*		precaudal	2	no	95-2-737

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
N122;W110	060-070	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	precaudal	1	no	95-2-752
N122;W110	FEA 9	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-2466
N124;W105	000-010	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-1000
N124;W105	000-010	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-1000
N124;W105	000-010	unidentified	*unidentified*			1	no	95-2-1000
N124;W105	010-020	vertebra	*Archoplites interruptus*	Sacramento perch	?	1	blk	95-2-1028
N124;W105	010-020	vertebra	*Cyprinidae*	minnow	?	1	no	95-2-1028
N124;W105	010-020	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	?	1	no	95-2-1028
N124;W105	010-020	vertebra	*unidentified*			1	no	95-2-1028
N124;W105	020-030	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-1047
N124;W105	020-030	vertebra	*Archoplites interruptus*	Sacramento perch		1	no	95-2-1047
N124;W105	020-030	vertebra	*Archoplites interruptus*	Sacramento perch		1	no	95-2-1047
N124;W105	020-030	pharyngeal	*Lavinia exilicauda*	hitch	left	1	no	95-2-1047
N124;W105	020-030	vertebra	*Ptychocheilus grandis*	Sacramento squawfish		1	no	95-2-1047
N124;W105	020-030	unidentified	*unidentified*			3	no	95-2-1047
N124;W105	020-030	vertebra	*unidentified*			5	no	95-2-1047
N124;W105	030-040	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	2	no	95-2-1067
N124;W105	030-040	centrum	*Elasmobranchi*	shark/ray	?	1	no	95-2-1067
N124;W105	030-040	vertebra	*Oncorhynchus tshawytscha?*	king salmon	precaudal	1	no	95-2-1067
N124;W105	030-040	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	caudal	2	no	95-2-1067
N124;W105	030-040	centrum	*unidentified*		caudal?	1	no	95-2-1067
N124;W105	040-050	cranial frag	*unidentified*			2	blk	95-2-2521
N124;W105	050-060	vertebra	*Archoplites interruptus*	Sacramento perch		1	blk	95-2-1113
N124;W105	060-070	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	1	wht	95-2-1126
N124;W105	060-070	vertebra	*unidentified*		caudal	1	no	95-2-1126
N124;W105	080-090	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	1	no	95-2-1154
N124;W105	080-090	vertebra	*unidentified*		caudal	1	no	95-2-1154
N124;W107	000-020	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-241
N124;W107	000-020	vertebra	*Lavinia exilicauda*	hitch	precaudal	1	no	95-2-241
N124;W107	000-020	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	caudal	1	no	95-2-241
N124;W107	000-020	vertebra	*unidentified*		precaudal	1	no	95-2-241
N124;W107	020-030	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-253
N124;W107	020-030	vertebra	*Hesperloceucus symmetricus?*	California roach	precaudal	1	no	95-2-253
N124;W107	030-040	centrum	*unidentified*		?	1	no	95-2-269
N124;W107	040-050	vomer	*Archoplites interruptus*	Sacramento perch	single	1	no	95-2-292
N124;W107	040-050	vertebra	*Cyprinidae*	minnow	caudal	2	no	95-2-292
N124;W107	040-050	atlas	*Lavinia exilicauda*	hitch	single	1	no	95-2-292
N124;W107	040-050	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	?	1	no	95-2-292
N124;W107	040-050	vertebra	*unidentified*			3	no	95-2-292
N124;W109	000-010	vertebra	*Cyprinidae*	minnow	caudal	2	no	95-2-1242
N124;W109	010-020	pharyngeal	*Lavinia exilicauda*	hitch	left	1	no	95-2-1263
N124;W109	010-020	centrum	*unidentified*		?	1	wht	95-2-1263

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
N124;W109	030-040	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-1312
N124;W109	030-040	vertebra	*Hesperloceucus symmetricus*	California roach	caudal	2	no	95-2-1312
N124;W109	030-040	cranial frag	*unidentified*			1	blk	95-2-1312
N124;W109	040-050	scute	*Acipenser transmontanus*	white sturgeon		4	no	95-2-1340
N124;W109	040-050	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	blk	95-2-1340
N124;W109	040-050	vertebra	*Catostomus occidentalis*	Sacramento sucker	precaudal	1	blk	95-2-1340
N124;W109	040-050	vertebra	*Cyprinidae*	minnow	caudal	1	blk	95-2-1340
N124;W109	040-050	vertebra	*unidentified*		caudal	2	1blk	95-2-1340
N125;W105	000-010	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-1571
N125;W105	010-020	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-1591
N125;W105	010-020	unidentified	*unidentified*			1	no	95-2-1591
N125;W105	020-030	vertebra	*Cyprinidae*	minnow	precaudal	1	no	95-2-1599
N125;W105	030-040	pharyngeal	*Mylopharodon conocephalus*	hardhead	left	1	no	95-2-1617
N125;W105	030-040	cranial frag	*unidentified*			2	no	95-2-1617
N125;W105	030-040	vertebra	*unidentified*		caudal	2	no	95-2-1617
N125;W105	030-040	vertebra	*unidentified*		precaudal	1	no	95-2-1617
N125;W105	040-050	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	2	no	95-2-1637
N125;W105	040-050	vertebra	*Cyprinidae*	minnow	caudal	2	no	95-2-1637
N125;W105	040-050	unidentified	*unidentified*			4	no	95-2-1637
N125;W105	040-050	vertebra	*unidentified*		precaudal	1	no	95-2-1637
N126;W103	010-020	cranial frag	*Acipenser transmontanus*	white sturgeon		2	no	95-2-1384
N126;W103	010-020	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	blk	95-2-1384
N126;W103	010-020	vertebra	*Cyprinidae*	minnow	precaudal	3	no	95-2-1384
N126;W103	020-030	cranial frag	*Acipenser transmontanus*	white sturgeon		2	no	95-2-1404
N126;W103	020-030	vertebra	*Cyprinidae*	minnow	precaudal	1	no	95-2-1404
N126;W103	020-030	pharyngeal	*Orothodon microlepidotus*	Sacramento blackfish	right	1	no	95-2-1404
N126;W103	020-030	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	precaudal	1	no	95-2-1404
N126;W103	020-030	unidentified	*unidentified*			4	no	95-2-1404
N126;W103	030-040	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	2	no	95-2-1427
N126;W103	030-040	ctenoid scale	*Archoplites interruptus*	Sacramento perch		1	no	95-2-1427
N126;W103	030-040	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-1427
N126;W103	030-040	unidentified	*unidentified*			2	no	95-2-1427
N126;W103	040-050	cranial frag	*Acipenser transmontanus*	white sturgeon		3	no	95-2-1447
N126;W103	040-050	ctenoid scale	*Archoplites interruptus*	Sacramento perch		1	no	95-2-1447
N126;W103	040-050	opercle	*Archoplites interruptus*	Sacramento perch	right	1	no	95-2-1447
N126;W103	040-050	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-1447
N126;W103	040-050	vertebra	*Cyprinidae*	minnow	caudal	2	no	95-2-1447
N126;W103	040-050	vertebra	*Cyprinidae*	minnow	precaudal	1	no	95-2-1447
N126;W103	040-050	parasphenoid	*Orothodon microlepidotus*	Sacramento blackfish	single	1	no	95-2-1447
N126;W103	040-050	unidentified	*unidentified*			1	no	95-2-1447
N126;W103	040-050	vertebra	*unidentified*		precaudal	1	no	95-2-1447
N126;W103	060-070	cranial frag	*Acipenser transmontanus*	white sturgeon		1	no	95-2-1470
N126;W103	060-070	pharyngeal	*Orothodon microlepidotus*	Sacramento blackfish	left	1	no	95-2-1470
N126;W103	060-070	unidentified	*unidentified*			1	no	95-2-1470
N126;W104	000-010	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-1918

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
N126;W104	000-010	cycloid scale	*Catostomus occidentalis*	Sacramento sucker		1	no	95-2-1918
N126;W104	000-010	vertebra	*Cyprinidae*	minnow	caudal	2	no	95-2-1918
N126;W104	000-010	unidentified	*unidentified*			2	no	95-2-1918
N126;W104	010-020	vertebra	*Cyprinidae*	minnow	caudal	3	no	95-2-1931
N126;W104	010-020	unidentified	*unidentified*			2	no	95-2-1931
N126;W104	010-020	vertebra	*unidentified*		precaudal	1	no	95-2-1931
N126;W104	020-030	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-1947
N126;W104	020-030	unidentified	*unidentified*			1	no	95-2-1947
N126;W104	020-030	vertebra	*unidentified*			1	no	95-2-1947
N126;W104	030-040	quadrate	*Archoplites interruptus*	Sacramento perch	right	1	no	95-2-1963
N126;W104	030-040	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	1	no	95-2-1963
N126;W104	030-040	pharyngeal	*Cyprinidae*	minnow	right	1	no	95-2-1963
N126;W104	030-040	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-1963
N126;W104	030-040	vertebra	*Cyprinidae*	minnow	precaudal	1	no	95-2-1963
N126;W104	030-040	basioccipital	*Orothodon microlepidotus*	Sacramento blackfish	single	1	no	95-2-1963
N126;W104	030-040	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	caudal	1	no	95-2-1963
N126;W104	030-040	unidentified	*unidentified*			6	no	95-2-1963
N126;W104	040-050	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-1973
N126;W104	040-050	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	2	no	95-2-1973
N126;W104	040-050	opercle	*Cyprinidae*	minnow	right	1	no	95-2-1973
N126;W104	040-050	preopercle	*Cyprinidae*	minnow	right	1	no	95-2-1973
N126;W104	040-050	unidentified	*unidentified*			5	no	95-2-1973
N126;W104	040-050	vertebra	*unidentified*		?	2	no	95-2-1973
N126;W106	000-010	vertebra	*Catostomus occidentalis*	Sacramento sucker	caudal	1	no	95-2-835
N126;W106	010-020	cranial frag	*Acipenser transmontanus*	white sturgeon		1	no	95-2-863
N126;W106	010-020	vertebra	*Cyprinidae*	minnow	precaudal	1	no	95-2-863
N126;W106	010-020	unidentified	*unidentified*			1	no	95-2-863
N126;W106	010-020	vertebra	*unidentified*		?	2	1blk	95-2-863
N126;W106	020-030	unidentified	*Acipenser transmontanus*	white sturgeon		4	1blk	95-2-880
N126;W106	020-030	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-880
N126;W106	020-030	pharyngeal	*Cyprinidae*	minnow	right?	1	no	95-2-880
N126;W106	020-030	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-880
N126;W106	020-030	vertebra	*Cyprinidae*	minnow	precaudal	1	no	95-2-880
N126;W106	030-040	cranial frag	*Acipenser transmontanus*	white sturgeon		1	no	95-2-913
N126;W106	030-040	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-913
N126;W106	030-040	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-913
N126;W106	030-040	pharyngeal	*Cyprinidae*	minnow	?	1	no	95-2-913
N126;W106	030-040	vertebra	*Orothodon microlepidotus*	Sacramento blackfish	caudal	1	no	95-2-913
N126;W106	030-040	atlas	*Ptychocheilus grandis*	Sacramento squawfish	single	1	no	95-2-913
N126;W106	030-040	axis	*Ptychocheilus grandis*	Sacramento squawfish	single	1	no	95-2-913
N126;W106	030-040	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	precaudal	1	no	95-2-913
N126;W106	030-040	unidentified	*unidentified*			1	no	95-2-913
N126;W106	040-050	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-937
N126;W106	040-050	pharyngeal	*Cyprinidae*	minnow	?	1	no	95-2-937
N126;W106	040-050	pharyngeal	*Orothodon microlepidotus*	Sacramento blackfish	left	1	no	95-2-937
N126;W106	040-050	unidentified	*unidentified*			1	no	95-2-937
N126;W106	050-060	vertebra	*Hesperloceucus symmetricus?*	California roach	precaudal	1	no	95-2-957
N126;W108	000-010	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	precaudal	2	no	95-2-1661

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
N126;W108	010-020	vertebra	*Cyprinidae*	minnow	precaudal	4	no	95-2-1678
N126;W108	010-020	pharyngeal	*Orothodon microlepidotus*	Sacramento blackfish	left	1	no	95-2-1678
N126;W108	020-030	vertebra	*Cyprinidae*	minnow	?	3	no	95-2-1699
N126;W108	020-030	vertebra	*Hesperloceucus symmetricus*	California roach	caudal	1	no	95-2-1699
N126;W108	020-030	vertebra	*Lavinia exilicauda*	hitch	caudal	2	no	95-2-1699
N126;W108	020-030	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	precaudal	1	no	95-2-1699
N126;W108	030-040	vertebra	*Cyprinidae*	minnow	caudal	1	no	95-2-1717
N126;W108	030-040	hypocoracoid	*Cyprinidae?*	minnow	?	1	no	95-2-1717
N126;W108	030-040	vertebra	*Lavinia exilicauda*	hitch	caudal	1	no	95-2-1717
N126;W108	030-040	posttemporal	*Orothodon microlepidotus*	Sacramento blackfish	left	1	no	95-2-1717
N126;W108	030-040	cranial frag	*unidentified*			1	yes	95-2-1717
N126;W108	030-040	unidentified	*unidentified*			5	no	95-2-1717
N126;W108	040-050	ctenoid scale	*Archoplites interruptus*	Sacramento perch		1	no	95-2-1736
N126;W108	040-050	vertebra	*Cyprinidae*	minnow	precaudal	1	no	95-2-1736
N126;W108	040-050	vertebra	*Lavinia exilicauda*	hitch	caudal	2	no	95-2-1736
N126;W108	040-050	cranial frag	*unidentified*			3	no	95-2-1736
N126;W108	040-050	ptertgiophore	*unidentified*			1	no	95-2-1736
N126;W108	040-050	unidentified	*unidentified*			2	no	95-2-1736
N126;W108	050-060	scute	*Acipenser transmontanus*	white sturgeon		2	no	95-2-1764
N126;W108	050-060	vertebra	*Cyprinidae*	minnow	?	2	no	95-2-1764
N126;W108	050-060	vertebra	*Embiotocidae*	surfperch	precaudal	2	no	95-2-1764
N126;W108	050-060	vertebra	*Lavinia exilicauda*	hitch	precaudal	2	no	95-2-1764
N126;W108	050-060	vertebra	*Lavinia exilicauda*	hitch	caudal	1	no	95-2-1764
N126;W108	050-060	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	?	2	no	95-2-1764
N126;W108	050-060	cranial frag	*unidentified*			1	no	95-2-1764
N126;W108	050-060	unidentified	*unidentified*			1	no	95-2-1764
N126;W108	060-070	posttemporal	*Cyprinidae*	minnow	right?	1	no	95-2-1788
N126;W108	060-070	vertebra	*Cyprinidae*	minnow	caudal	3	no	95-2-1788
N126;W108	060-070	vertebra	*Embiotocidae*	surfperch	caudal	2	no	95-2-1788
N126;W108	060-070	vertebra	*Embiotocidae*	surfperch	precaudal	1	no	95-2-1788
N126;W108	060-070	pharyngeal	*Mylopharodon conocephalus*	hardhead	left	1	no	95-2-1788
N126;W108	060-070	pharyngeal	*Orothodon microlepidotus*	Sacramento blackfish	left	1	no	95-2-1788
N126;W108	060-070	cranial frag	*unidentified*			1	no	95-2-1788
N126;W108	060-070	vertebra	*unidentified*			2	no	95-2-1788
N126;W108	080-090	epihyal	*Embiotocidae*	surfperch	right	1	no	95-2-1824
N126;W108	080-090	vertebra	*Embiotocidae*	surfperch	caudal	1	no	95-2-1824
N126;W110	000-010	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	1	blk	95-2-1499
N126;W110	000-010	vertebra	*Lavinia exilicauda*	hitch	precaudal	1	no	95-2-1499
N126;W110	000-010	unidentified	*unidentified*			1	no	95-2-1499
N126;W110	010-020	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	2	no	95-2-2221
N126;W110	010-020	vertebra	*Lavinia exilicauda*	hitch	caudal	2	no	95-2-2221
N126;W110	010-020	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	caudal	1	no	95-2-2221
N126;W110	020-030	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-2250
N126;W110	020-030	vertebra	*Catostomus occidentals*	Sacramento sucker	caudal	1	no	95-2-2250
N126;W110	020-030	vertebra	*Catostomus occidentals*	Sacramento sucker	precaudal	1	no	95-2-2250
N126;W110	020-030	pharyngeal	*Orothodon microlepidotus*	Sacramento blackfish	right	1	no	95-2-2250
N126;W110	020-030	centrum	*unidentified*			1	no	95-2-2250
N126;W110	030-040	cranial frag	*Acipenser transmontanus*	white sturgeon		3	no	95-2-2266
N126;W110	030-040	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-2266

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
N126;W110	030-040	unidentified	*Acipenser transmontanus*	white sturgeon		1	no	95-2-2266
N126;W110	030-040	basioccipital	*Archoplites interruptus*	Sacramento perch	single	1	no	95-2-2266
N126;W110	030-040	ceratohyal	*Archoplites interruptus*	Sacramento perch	left	1	no	95-2-2266
N126;W110	030-040	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	2	blk	95-2-2266
N126;W110	030-040	vertebra	*Catostomus occidentalis*	Sacramento sucker	precaudal	1	no	95-2-2266
N126;W110	030-040	vertebra	*Embiotocidae*	surfperch	precaudal	2	no	95-2-2266
N126;W110	030-040	pharyngeal	*Pogonichthys macrolepidotus*	splittail	right	2	no	95-2-2266
N126;W110	030-040	axis	*Ptychocheilus grandis*	Sacramento squawfish	single	1	no	95-2-2266
N126;W110	030-040	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	caudal	1	no	95-2-2266
N126;W110	030-040	unidentified	*unidentified*			3	no	95-2-2266
N126;W110	040-050	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-2278
N126;W110	040-050	hyomandibula	*Archoplites interruptus*	Sacramento perch	right	1	no	95-2-2278
N126;W110	040-050	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	1	no	95-2-2278
N126;W110	040-050	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	1	blk	95-2-2278
N126;W110	040-050	vertebra	*Cyprinidae*	minnow	precaudal	2	no	95-2-2278
N126;W110	040-050	pharyngeal	*Orothodon microlepidotus*	Sacramento blackfish	left	1	no	95-2-2278
N126;W110	040-050	opercle	*Pogonichthys macrolepidotus*	splittail	left	1	no	95-2-2278
N126;W110	040-050	centrum	*unidentified*			1	no	95-2-2278
N126;W110	040-050	unidentified	*unidentified*			1	no	95-2-2278
N126;W110	050-060	cranial frag	*Acipenser transmontanus*	white sturgeon		1	no	95-2-2291
N126;W110	050-060	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-2291
N126;W110	050-060	articular	*Archoplites interruptus*	Sacramento perch	right	1	no	95-2-2291
N126;W110	050-060	centrum	*Archoplites interruptus*	Sacramento perch	caudal	2	no	95-2-2291
N126;W110	050-060	dentary	*Archoplites interruptus*	Sacramento perch	right	1	no	95-2-2291
N126;W110	050-060	quadrate	*Archoplites interruptus*	Sacramento perch	right	1	no	95-2-2291
N126;W110	050-060	centrum	*Cyprinidae*	minnow	precaudal	2	no	95-2-2291
N126;W110	050-060	opercle	*Lavinia exilicauda*	hitch	right	1	no	95-2-2291
N126;W110	050-060	articular	*Ptychocheileus grandis*	Sacramento squawfish	left	1	no	95-2-2291
N126;W110	050-060	centrum	*Ptychocheilus grandis*	Sacramento squawfish	?	1	no	95-2-2291
N126;W110	050-060	unidentified	*unidentified*			2	no	95-2-2291
N126;W110	060-070	cranial frag	*Acipenser transmontanus*	white sturgeon		1	no	95-2-2308
N126;W110	060-070	vertebra	*Catostomus occidentalis*	Sacramento sucker	?	1	yes	95-2-2308
N126;W110	060-070	pharyngeal	*Lavinia exilicauda*	hitch	left	1	no	95-2-2308
N126;W110	060-070	pharyngeal	*Orothodon microlepidotus*	Sacramento blackfish	left	1	no	95-2-2308
N126;W110	060-070	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	precaudal	1	no	95-2-2308
N126;W110	060-070	centrum	*unidentified*			1	no	95-2-2308
N126;W110	060-070	unidentified	*unidentified*			3	no	95-2-2308
N126;W110	070-080	atlas	*Archoplites interruptus*	Sacramento perch	single	1	no	95-2-2321
N126;W110	070-080	quadrate	*Archoplites interruptus*	Sacramento perch	left	1	no	95-2-2321
N126;W110	070-080	subopercle	*Archoplites interruptus*	Sacramento perch	left	1	no	95-2-2321
N126;W110	070-080	pharyngeal	*Mylopharodon conocephalus*	hardhead	right	1	no	95-2-2321
N126;W110	070-080	unidentified	*unidentified*			1	no	95-2-2321
N126;W110	080-090	scute	*Acipenser transmontanus*	white sturgeon		1	no	95-2-2340
N126;W110	080-090	atlas	*Archoplites interruptus*	Sacramento perch	single	1	no	95-2-2340
N126;W110	080-090	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-2340
N126;W110	080-090	unidentified	*Oncorhynchus sp.*	salmon/steelhead		1	no	95-2-2340
N126;W110	080-090	centrum	*unidentified*			1	no	95-2-2340
N126;W110	100-110	centrum	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-2367
N126;W110	100-110	centrum	*Cyprinidae*	minnow	precaudal	1	no	95-2-2367

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
N126;W110	110-120	centrum	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-2376
N126;W110	120-130	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-2376
N126;W110	120-130	vertebra	*Lavinia exilicauda*	hitch	precaudal	1	no	95-2-2376
N126;W110	130-140	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-2401
N126;W110	130-140	vertebra	*Cyprinidae*	minnow	precaudal	1	no	95-2-2401
N126;W110	130-140	axis	*Mylopharodon conocephalus*	hardhead	single	1	no	95-2-2401
N126;W110	140-150	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-2-2417
N140;W110	000-020	cranial frag	*Acipenser transmontanus*	white sturgeon		1	no	95-2-2124
N160;W110	000-020	cranial frag	*Acipenser transmontanus*	white sturgeon		1	no	95-2-2157
N160;W110	000-020	atlas	*Archoplites interruptus*	Sacramento perch	single	1	no	95-2-2157

TABLE 4
FISH REMAINS RECOVERED FROM CA-CCO-696, FLOTATION SAMPLES

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
FEA 12		vertebra	*Archoplites interruptus*	Sacramento perch		1	wht	95-8-592
FLOT 068A	FEA 1	centrum	*unidentified*		precaudal	4	no	1/16"
FLOT 074A	FEA 7	vertebra	*Cyprinidae*	minnow	caudal	1	no	1/16"
FLOT 074A	FEA 7	vertebra	*unidentified*		caudal	1	no	1/16"
FLOT 074A	FEA 7	vertebra	*unidentified*		precaudal	1	no	1/16"
FLOT 074B	FEA 7	vertebra	*unidentified*		?	2	1wht;1no	Exp. 1
FLOT 076A	FEA 12	vertebra	*unidentified*		?	3	1yes;2no	1/16"
FLOT 077A	FEA 16	vertebra	*Archoplites interruptus*	Sacramento perch	?	3	2wht;2no	1/16"
FLOT 077A	FEA 16	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	1/8"
FLOT 078A	FEA 15	centrum	*Archoplites interruptus*	Sacramento perch	?	1	no	1/8"
FLOT 078A	FEA 15	vertebra	*unidentified*		?	2	no	1/16"
FLOT 078A	FEA 15	vertebra	*unidentified*		?	2	no	1/16"
FLOT 079	FEA 17	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	wht	1/16"
FLOT 086	BUR 139	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	1	no	1/16"
FLOT 090A	050-074	vertebra	*Archoplites interruptus*	Sacramento perch	caudal	4	no	1/16"
FLOT 090A	050-074	vertebra	*Cyprinidae*	minnow	precaudal	3	no	1/16"
FLOT 090A	050-074	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	caudal	2	no	1/16"
FLOT 091A		vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	1/16"
FLOT 091A		vertebra	*unidentified*		?	1	no	1/16"
FLOT 092A	105-128	vertebra	*Archoplites interruptus*	Sacramento perch	?	1	no	1/16"
FLOT 092A	105-128	vertebra	*Cyprinidae*	minnow		1	no	1/16"
FLOT 093A	083-105	vertebra	*Cyprinidae*	minnow		1	no	1/16"
FLOT 094A	COL 8	vertebra	*Archoplites interruptus*	Sacramento perch		6	2wht;4no	1/16"
FLOT 094A	COL 8	vertebra	*Archoplites interruptus*	Sacramento perch		1	no	1/8"
FLOT 094A	COL 8	vertebra	*Cyprinidae*	minnow		7	no	1/16"

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
FLOT 094A	COL 8	vertebra	*Cyprinidae*	minnow		7	no	1/16"
FLOT 094A	COL 8	vertebra	*unidentified*			2	no	1/16"
FLOT 095b	060-085	vertebra	*Cyprinidae*	minnow		2	no	1/16"
FLOT 100A	FEA 13	vertebra	*Archoplites interruptus*	Sacramento perch		1	no	1/16"
FLOT 100A	FEA 13	vertebra	*unidentified*			1	no	1/16"

TABLE 5
FISH REMAINS RECOVERED FROM CA-CCO-637, FLOTATION SAMPLES

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
FLOT 53	?	atlas	*Archoplites interruptus*	Sacramento perch	single	1	wht	1/8"
FLOT 53	?	vertebra	*Cyprinidae*	minnow	?	1	no	1/8"
FLOT 53	?	vertebra	*unidentified*		?	1	no	1/8"
FLOT 54	BUR 1	axis	*Archoplites interruptus*	Sacramento perch	single	1	no	1/8"
FLOT 56A	060-070	vertebra	*Archoplites interruptus*	Sacramento perch	?	1	wht	1/16"
FLOT 56A	060-070	vertebra	*Cyprinidae*	minnow	?	1	no	1/16"
FLOT 56B	060-070	atlas	*Archoplites interruptus*	Sacramento perch	single	1	no	1/16"
FLOT 56B	060-070	axis	*Archoplites interruptus*	Sacramento perch	single	1	no	1/16"
FLOT 57	080-090	vertebra	*Archoplites interruptus*	Sacramento perch	?	4	1yes;3no	1/16"
FLOT 57	080-090	vertebra	*Cyprinidae*	minnow	?	1	blk	1/16"
FLOT 58A	065-080	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	FEA 2
FLOT 58A	065-080	vertebra	*unidentified*		?	1	wht	1/16"
FLOT 59A	060-110	vertebra	*Archoplites interruptus*	Sacramento perch	?	2	1wht;1no	S27;W3
FLOT 59A	060-110	vertebra	*Cyprinidae*	minnow	?	6	no	S27;W3
FLOT 59B	060-110	vertebra	*Archoplites interruptus*	Sacramento perch	?	1	wht	S27;W3
FLOT 59B	060-110	vertebra	*Cyprinidae*	minnow	?	9	1wht;8no	S27;W3
FLOT 59B	060-110	vertebra	*Ptychocheilus grandis*	Sacramento squawfish	precaudal	1	no	S27;W3
FLOT 60	FEA 5	vertebra	*Archoplites interruptus*	Sacramento perch	?	2	1blue;1no	S33;W3
FLOT 60	FEA 5	vertebra	*Archoplites interruptus*	Sacramento perch	?	1	no	S33;W3
FLOT 60	FEA 5	vertebra	*Cyprinidae*	minnow	?	2	no	S33;W3
FLOT 60	FEA 5	vertebra	*Cyprinidae*	minnow	?	1	no	S33;W3
FLOT 60	FEA 5	vertebra	*unidentified*		?	2	1wht;1no	S33;W3
FLOT 63	FEA 4	vertebra	*Archoplites interruptus*	Sacramento perch	?	2	1wht;no	S33;W3
FLOT 63	FEA 4	vertebra	*Cyprinidae*	minnow	?	2	no	S33;W3
FLOT 63	FEA 4	vertebra	*unidentified*		?	1	no	S33;W3

TABLE 6
FISH REMAINS RECOVERED FROM CA-CCO-696, MICRO UNITS AND OTHER

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
BUR 10		preopercle	*Cyprinidae?*	minnow	right?	1	no	95-8-477
BUR 110	cran mtrx	vertebra	*Cyprinidae?*	minnow	caudal	1	no	95-8-1964
BUR 19		vertebra	*Cyprinidae?*	minnow	precaudal	1	no	95-8-1972
FEA 12		vertebra	*Embiotocidae*	surfperch	caudal	1	yes	95-8-590
M1;S0	040-050	vertebra	*Archoplites interruptus*	Sacramento perch	precaudal	1	no	95-8-1509
M2;S0	060-070	vertebra	*unidentified*		precaudal	1	no	95-8-1634
M2;S0	080-090	vertebra	*unidentified*		precaudal	1	no	95-8-1651
M2;S5	050-060	vertebra	*Cyprinidae*	minnow	caudal	2	no	95-8-1694
M2;S5	060-070	vertebra	*Archoplites interruptus*	Sacramento perch	?	1	no	95-8-1703
M2;S5	070-080	vertebra	*Cyprinidae*	minnow	precaudal	2	1yes;1no	95-8-1711
M?;S5	030-040	vertebra	*Cyprinidae*	minnow	precaudal	1	no	95-8-1454
M?;S5	070-080	vertebra	*unidentified*		caudal	1	no	95-8-1454

TABLE 7
FISH REMAINS RECOVERED FROM CA-CCO-459

UNIT	DEPTH	ELEMENT	SPECIES	COMMON	ASPECT	FREQ	BURNED	REMARKS
S0;W0	030-040	vertebra	*unidentified*		precaudal	1	no	95-3-15
SCR SPOILS		ceratohyal	*Cyprinidae*	minnow	?	1	no	95-3-162
SCR SPOILS		vertebra	*Oncorhynchus tshawytscha?*	king salmon	?	1	no	95-3-162
SCR SPOILS		cleithrum	*unidentified*		?	1	no	95-3-162

APPENDIX K

SHELLFISH REMAINS

APPENDIX K
FAUNAL REMAINS, SHELLFISH

Julia Huddleson

SPECIES REPRESENTED

Faunal shellfish remains from Los Vaqueros Project sites consist primarily of freshwater species, although marine species were also identified. Three genera of freshwater mussels are native to California and are known to have been used as a food source in local prehistoric diets (Levy 1978:403; Melton 1995:251). All three genera are in the Unionacea superfamily, a large bivalve fauna of permanent freshwater lakes, rivers, and ponds. *Anodonta* sp. and *Gonidea angulata* belong to the family Unionidae, and *Margaritifera falcata* belongs to the family Margaritiferadae. Each species inhabits a similar, yet unique, environment. *Anodonta* sp. are found in drainages west of the continental divide and inhabit slightly warmer rivers and lakes ranging from 0.5 to 7 meters deep. Little ecological data exists for *Gonidea angulata*, the only species in this genus. Its historic environment has been altered, but it probably inhabited streams with minor sediments (Melton 1995:252). *Margaritifera falcata,* the only species in this genus found in Pacific Coast drainages, prefers clear, fast-moving streams (Melton 1995:252).

Each species has distinguishing characteristics that are used in identification. *Margaritifera falcata* is most easily identifiable because it has a thick shell, rhomboidal shape, and pseudocardinal teeth that project from the hinge area (Pennak 1989:582). These teeth are distinctive and preserve well archaeologically (Eugster 1990:67). *Gonidea angulata* is smooth shelled, elongated, and has a characteristic high, sharp posterior ridge (Pennak 1989:584). *Anodonta* sp. is elliptically shaped with parallel ridges on the exterior and has a characteristically thin fragile shell (Pennak 1989:590). Archaeologically, *Anodonta* sp. appears to be the most fragmentary (Eugster 1990:69).

Only a few pieces of the freshwater shellfish are identifiable to species due to the fragmentary nature of the remains. A total of 4 specimens recovered from sites are positively identified as *Gonidea angulata* (2 from CA-CCO-458/H, 1 from CCO-637, and 1 from CCO-696). In the off-site investigations, a specimen of *Gonidea angulata* was found in the dam area. Additional off-site research located several pieces of *Anodonta* sp. in Trench 10-4-94 from the buried stream channel at CCO-447/H. There is no evidence of *Margaritifera falcata* from any of the sites or off-site investigations. This sparse information still leaves the question as to the genus of the majority of the freshwater mussel. A total of 144.3 g were recovered from excavation. The fragmentary condition of the shell indicates *Anodonta* sp., however only *Gonidea angulata* has been identified at any of the sites. It is possible that both genera, *Anodonta* sp. and *Gonidea angulata*, are present and represent different habitats in the Kellogg Creek drainage. *Anodonta* sp. would probably have been collected from a lake or slow-moving river while *Gonidea angulata* was probably collected from a smaller body of water (Melton 1995:252).

Marine species recovered from the sites include *Cerithidea californica* (California horn shell), *Clinocardium nuttali* (Nuttall's cockle), *Haliotis* sp. (abalone), *Macoma nasuta* (bent-nose clam), *Mytilus edulis* (bay mussel), and *Olivella* sp. (olive snail). *Cerithidea californica* is a very common univalve and is found on intertidal mud flats at quiet bays and estuaries (Abott 1986:88). *Clinocardium nuttali* is found in mud or sand of bays, sloughs, and estuaries and shallow, protected areas of the open coast (Fitch 1953:57; Morris 1966:24). *Haliotis* sp. lives along rocky shores in intertidal waters of the open ocean. *Macoma nasuta* burrows 4 to 8 inches into mud and muddy sands of shallow sheltered

bays, lagoons and estuaries (Fitch 1953:74; Morris 1966:35). *Mytilus edulis* grows in colonies, in rocky locations inshore at the low-tide level, where they are attached to rocks and other firm surfaces in sheltered areas (Fitch 1953:53; Morris 1966:7). Two species of the genus *Olivella* occur in California: *Olivella baetica* and *O. biplicata*. *O. biplicata* is the species most commonly found in archaeological sites. This species is found in colonies in shallow water on sandflats of lagoons, bays and protected areas of the outer coast (Morris 1966:99).

The marine species *Cerithidea californica, Clinocardium nuttali, Macoma nasuta*, *Mytilus edulis*, and *Olivella* sp. were all available in mud flats and sandy areas of the San Francisco Bay, Suisin Bay, and the Delta. Only *Haliotis* comes from the Pacific Ocean.

METHODS

All shellfish remains from 1/4"-screened excavation units were collected, cataloged, weighed, and identified to genus/species using a comparative collection at the Anthropological Studies Center, Sonoma State University. Nine invertebrate taxa were recovered from the seven sites, but only a fraction occurred in quantities large enough to suggest dietary significance.

FINDINGS BY SITE

CA-CCO-458/H

Both freshwater and marine shellfish species were recovered from CA-CCO-458/H: unidentified freshwater mussel (88.5 g), *Gonidea angulata* (19.3 g), *Cerithidea californica* (1.3 g), *Haliotis* sp. (1.8 g), *Mytilus edulis* (10.7 g), *Macoma nasuta* (4.5 g), *Clinocardium nuttali* (4.6 g), and *Olivella sp.* (0.6 g). Freshwater mussel had by far the greatest representation by weight, almost five times greater than all other species combined. The marine shell reains most likely represented a dietary resource despite the low frequency.

There is distributional variation between the shell species. Freshwater mussel was recovered in greater quantities from the northern portion of the area exposure in the West Locus and increased by weight with depth. Adding the weight of the shell across the exposure by level, the weight increases, despite the fact that several units were excavated only to 30 or 40 cm.

Table K-1. Weight of Freshwater Mussel from CA-CCO-458/H, by Level

0-10 cm	11.1
10-20 cm	17.3
20-30 cm	24.5
30-40 cm	12.7
40-50 cm	33.1

Cerithidea californica was recovered from units in the southwestern portion of the area exposure.. *Haliotis* and *Olivella* are primarily in the northeastern portion of the exposure. *Macoma nasuta* and *Clinocardium nuttali* are present in very low quantities.

CA-CCO-459

A small amount of shell was recovered from this site (2.3 g). Both freshwater and marine shellfish species were recovered from CA-CCO-459: unidentified freshwater mussel (1.9 g) and *Macoma nasuta* (0.4 g). These insignificant amounts indicate a lack of reliance on shellfish as a food source at this site.

CA-CCO-468

A small amount of shell was recovered from this site (1.7 g), indicating little reliance on shellfish as a dietary source. Both freshwater and marine shellfish species were recovered: unidentified freshwater mussel (0.4 g) and *Clinocardium nuttali* (1.3 g).

CA-CCO-636

A small amount of shell was recovered from this site, indicating little reliance on shellfish as a dietary source. Freshwater shellfish was recovered from CA-CCO-636: unidentified freshwater mussel (0.8 g).

CA-CCO-637

A small amount of shell was recovered from this site, indicating little reliance on shellfish as a dietary source. Freshwater shellfish was recovered from CA-CCO-637: unidentified freshwater mussel (1.6 g), and *Gonidea angulata* (1.7 g).

CA-CCO-696

Shell was recovered throughout the site in small quantities. Only freshwater shellfish species were recovered from CA-CCO-696: unidentified freshwater mussel (30.1 g) and *Gonidea angulata*(5.0 g). Roughly one-third of the burials had freshwater shell in either the exposure matrix or the burial matrix. Because the burials were not excavated in units, there is no volumetric control for comparing the quantities of shell. It is evident that the shell in and around the burials is part of the midden and not intentionally included with burials.

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LOS VAQUEROS FAUNAL SHELL

CA-CC0-459

Unit	Depth	Fresh Water	*Macoma*
TR SPOILS		0.7	0
BACK DIRT		0	0.4
S0/W0	0-10 cm	0.1	0
	10-20 cm	0	0
	20-30 cm	0	0
	30-40 cm	0.6	0
	40-50 cm	0	0
	50-60 cm	0	0
	60-70 cm	0	0
	70-80 cm	0	0
S1/W0	0-10 cm	0	0
	10-20 cm	0.2	0
S2/W0	0-10 cm	0	0
	10-20 cm	0.3	0

CA-CCO-468/462

Unit	Depth	Fresh Water	*Clinocardium*
N0/W2	SURF	0	1.3
	10-20 cm	0.3	0
N0/W50	0-20 cm	0.1	0

CCO-636

Unit	Depth	Fresh Water
TRENCH 4	400-400 cm	0.8

CCO-637

Unit	Depth	Fresh Water	*Gonidea angulata*	Unidentified
BURIAL 9		0	0	0
S26/W1	60-80 cm	0	1.7	0
S27/W3	130-140 cm	0.2	0	0
	140-150 cm	0.1	0	0
S29/W3	80-90 cm	0	0	1.1
	90-100 cm	0.1	0	0
S31/W3	110-120 cm	0.1	0	0
	120-130 cm	0	0	0
S33/W3	90-100 cm	0.9	0	0
	100-110 cm	0.1	0	0
S38/W0	90-110 cm	0.1	0	0

CA-CCO-696

BURIALS		Unid. Fresh Water	*Gunidia angulata*	*Macoma nasuta*
	B-1	2.1	0	0
	B-4	0.6	0	0
	B-5	0.4	0	0
	B-9	0.2	0	0
	B-12	0	0	0
	B-14	0.1	0	0
	B-15	0.3	0	0
	B-16	0	0	0
	B-16+	0.8	0	0
	B-18	0.2	0	0
	B-19	0	0	0.1
	B-23	0.1	0	0
	B-26	0.2	0	0
	B-31	0.2	0	0
	B-33+	0.3	0	0
	B-36	0.1	0	0
	B-37	0.9	0	0
	B-45	0.2	0	0
	B-49	0.2	0	0
	B-51	0.1	0	0
	B-55	0.2	0	0
	B-57	0.1	0	0
	B-60	0.1	0	0
	B-64	0.2	0	0
	B-67	0.2	0	0
	B-70	0.1	0	0
	B-73	0.1	0	0
	B-90	0.3	0	0
	B-94	0.1	0	0
	B-97	0.1	0	0
	B-104	4.8	0	0
	B-105	0.2	0	0
	B-120A	0.6	0	0
	B-125	0.2	0	0
	B-126+	0.3	0	0
	B-128	5.1	0	0
	B-130	0.5	0	0
	B-138	1.0	0	0
	B-139	0.2	0	0
	B-140	0.1	0	0
	B-141	1.4	0	0
	B-143	0.1	0	0
	B-147	0	5.0	0
	B-153	2.3	0	0
	B-158	0.9	0	0

CA-CCO-696, continued

		Unid. Fresh Water	*Gunidia angulata*	*Macoma nasuta*
F-12		0.3	0	0
F-16		0.7	0	0
EX1, SE,F-7		0.7	0	0
EX2,N 1/3 OF EXP		0	0	0
	60 cm	0	0	0
M10S	90-100 cm	0	0	0
	110-120 cm	0	0	0
M15S	80-90 cm	0	0	0
	100-110 cm	0	0	0
	110-120 cm	0	0	0
M20S	60-70 cm	0	0	0
	90-100 cm	0	0	0
M25S	80-90 cm	0	0	0
	100-110 cm	0	0	0
M5S	30-40 cm	0	0	0
	80-90 cm	0	0	0
N0/W2	110-120 cm	0	0	0
N0/W5	120-130 cm	0.9	0	0
S2.5/E22	80-90	0.1	0	0
	130-140 cm	0.4	0	0
S2.5/E28	30-40 cm	0	0	0
S9/E9	80-90 cm	0	0	0
S9/W2	80-90 cm	0	0	0
	90-100 cm	0	0	0
TR 4-27-1		0.8	0	0.1
TR 5-5-3		0	0	0
W-1	DEEP	0	0	0

CA-CCO-458

Unit/Depth (cm)	Fresh Water	*Gonidea*	*Mytilus*	*Macoma*	*Clinocardium*	*Olivella*	*Cerithidea*	*Haliotis*	Unidentified
0-10	0.7	0	0	0	0.1	0	0	0	0
BUR 2	3.6	0	0	0	0	0	0	0	0
EAST									
N196/E20									
60-70	0.2	0	0	0	0	0	0	0	0
N204/E20									
50-60	0.1	0	0	0	0	0	0	0	0
SGU									
N90/W120	0-20	0.2	0	0	0	0	0	0	0
N110/W80	0-20	0	0	1.3	0	0	0	0	0
N110/W130	0-20	0.1	0	0	0	0	0	0	0
N120/W120	0-20	1.2	0	0	0.4	0	0	0	0
N120/W60	0-20	0	0	0	0	0	0	0	0
N120/W90	0-20	0.4	0	0	0	0	0	0	0
N130/W100	0-20	1.2	0	0	0	0	0	0	0
N160/W110	0-20	0	0	0.1	0	0	0	0	0
N192/E10	0-20	0	0	0	0	0	0	0	0

UNITS

Unit/Depth (cm)	Fresh Water	*Gonidea*	*Mytilus*	*Macoma*	*Clinocardium*	*Olivella*	*Cerithidea*	*Haliotis*	Unidentified
N120/W105									
0-10	0.7	0	0	0	0.1	0	0	0	0
10-20	1.2	0	0	0	0	0	0	0	0.2
20-30	1.1	0	0.1	0.3	0	0	0	0	0
30-40	0.7	0	0.2	0	0	0	0	0	0
N120/W106									
0-10	0.6	0	1.0	0.3	0	0	0	0	0
10-20	0.8	0	0.3	0	0	0	0	0	0
20-30	1.0	0	0	0	0	0	0	0	0
30-40	0.7	0	0	0	0	0.1	0	0	0
N120/W107									
0-10	0.2	0	0	0	0	0	0	0	0
10-20	0.6	0	0.1	0	0	0	0.3	0	0
20-30	1.0	0	0.1	0	0	0	0	0	0
30-40	0.1	0	0	0	0	0	0	0	0
N120/W108									
0-10	0.4	0	0	0	0	0	0	0	0
10-20	0.7	0	0	0	0	0	0	0	0.3
20-30	1.3	0	0	0	0	0	0.1	0	0
30-40	0.2	0	0.1	0	1.8	0	0	0	0
N122/W104									
0-10	0.8	0	0	0	0	0	0	0	0
10-20	0.8	0	0	0	0	0	0	0	0
20-30	1.3	0	0	0	0	0	0	0	0
30-40	0.3	0	0	0	0	0	0	0	0
N122/W105									
0-10	0.1	0	0	0	0	0	0	0	0
10-20	1.4	0	0.1	0	0	0	0	0	0
20-30	1.1	0	0	0	0	0	0	0	0
N122/W106									
0-10	0.4	0	0	0	0	0	0	0	0
10-20	0.2	0	0.1	0	0	0	0	0	0
20-30	0.4	0	0	0	0	0	0	0	0
30-40	0.2	0	0	0	0	0	0	0	0
N122/W107									
0-10	0.6	0	0	0	0	0	0	0	0
10-20	0.7	0	0	0	0	0	0	0	0
20-30	0.7	0	0	0	0	0	0	0	0

Unit/Depth (cm)	Fresh Water	*Gonidea*	*Mytilus*	*Macoma*	*Clinocardium*	*Olivella*	*Cerithidea*	*Haliotis*	Unidentified
N122/W108									
0-10	1.1	0	0	0	0	0	0	0	0
10-20	1.0	0	0	0	0	0	0	0	0
20-30	1.0	0	0	0	0.3	0	0	0	0.1
30-40	1.4	0	0	0	0	0	0	0	0
40-50	1.0	0	0	0	0	0	0	0	0
N122/W110									
0-10	0.6	0	2.1	0.2	0	0	0	0	0
10-20	0.1	0	0	0	0	0	0	0	0
20-30	0.3	0	0	0	0	0	0.9	0	0
30-40	2.0	0	0	0	0	0	0	0	0
40-50	3.3	0	0	0	0	0	0	0	0
50-60	0.8	0	0.2	0.3	0	0	0	0	0
60-70	0.2	0	0	0	0	0	0	0	0
N122/W110/109									
F-9	0	0	0	0	0	0	0	0	0
N124/105W									
0-10	0.4	0	0	0	0	0	0	0	0
10-20	2.2	0	0	0	0	0	0	0	0
20-30	0.9	0	0.1	0	0	0	0	0	0
30-40	0.6	0	0	0	0	0	0	0	0
40-50	3.3	0	0.1	0	0	0	0	0	0
50-60	1.3	0	0.1	0	0	0	0	0.8	0
60-70	0	0	0	0	0	0	0	0	0
70-80	0.8	0	0	0	0	0	0	0	0
80-90	0	0	0	0	0	0	0	0	0
90-100	0.1	0	0	0	0	0	0	0	0
100-110	0	0	0	0	0	0	0	0	0
110-120	0.4	0	0	0	0	0	0	0	0
120-130	0	0	0	0	0	0	0	0	0
130-140	0.1	0	0	0	0	0	0	0	0
N124/W107									
0-10	1.5	0	0.6	0	0.1	0	0	0	0.1
10-20	0	0	0	0	0	0	0	0	0
20-30	1.8	0	0	0	0.2	0	0	0	0
30-40	0.9	0	0.1	0	0	0.1	0	0	0
40-50	1.5	0	0.4	0	0	0	0	0	0
N124/W109									
0-10	1.2	0	0.2	0	0	0	0	0	0
10-20	0.7	0	0	0.5	0	0	0	0	0
20-30	4.9	0	0.2	0	0	0	0	0	0
30-40	0.6	0	0	0	0	0	0	0	0
40-50	0	0	0	0	1.5	0	0	0	0
N125/W105									
0-10	0.2	0	0	0	0	0	0	0	0
10-20	0.2	0	0	0.8	0	0	0	0	0
20-30	1.2	0	0	0	0	0	0	0	0
30-40	0.1	0	0	0	0.6	0	0	0	0
N126/W103									
0-10	0.1	0	0.4	0	0	0	0	0	0
10-20	2.6	0	0.1	0	0	0	0	0.6	0
20-30	0.6	0	0	0	0	0	0	0	0.1
30-40	0.4	0	0	0	0	0	0	0	0
40-50	1.0	0	0	0	0	0	0	0	0
50-60	2.3	0	0	0	0	0	0	0	0
N126/W104									
0-10	0.7	0	0.1	0.2	0	0	0	0	0
10-20	0.6	0	0.1	0	0	0	0	0	0
20-30	1.6	0	0.2	0.3	0	0.2	0	0	0
30-40	0.3	0	0	0	0	0	0	0	0
40-50	0.8	0	0.1	0	0	0	0	0.4	0
50-60	0.5	0	0	0	0	0	0	0	0

Unit/Depth (cm)	Fresh Water	*Gonidea*	*Mytilus*	*Macoma*	*Clinocardium*	*Olivella*	*Cerithidea*	*Haliotis*	Unidentified
N126/W106									
0-10	0.1	0	0	0	0	0	0	0	0
10-20	0.8	0	0	0	0	0.1	0	0	0
20-30	1.2	0	0.1	0.1	0	0	0	0	0.1
30-40	0.4	0	0	0	0	0	0	0	0
40-50	1.3	0	0.2	0	0	0	0	0	0
43	0	13.9	0	0	0	0	0	0	0
50-60	0.1	0	0	0	0	0	0	0	0
N126/W108-107									
F-1	1.7	0	0.2	0	0	0	0	0	0
N126/W106-105									
F-7	0.2	0	0	0	0	0	0	0	0
N126/W108									
0-10	1.1	0	0	0	0	0	0	0	0
10-20	0.7	0	0	0.1	0	0	0	0	0
20-30	2.1	0	0.1	0.2	0	0	0	0	0
30-40	0.5	0	0.6	0	0	0	0	0	0.1
40-50	1.5	0	0.5	0	0	0	0	0	0
50-60	1.0	0	0	0	0	0	0	0	0
60-70	1.5	0	0.1	0.2	0	0	0	0	0
70-80	2.7	0	0	0	0	0	0	0	0
80-90	0.1	0	0	0	0	0	0	0	0
N126/W110									
0-10	0.3	0	0	0	0	0.1	0	0	0
10-20	2.0	0	0	0	0	0	0	0	0
20-30	1.0	0	0	0	0	0	0	0	0
30-40	3.3	0	0	0	0	0	0	0	0
40-50	1.3	5.4	0	0	0	0	0	0	0
50-60	0.2	0	0	0	0	0	0	0	0
60-70	0.1	0	0	0.3	0	0	0	0	0
70-80	0.8	0	0	0	0	0	0	0	0
80-90	0.5	0	0	0	0	0	0	0	0
90-100	0.5	0	0.3	0	0	0	0	0	0
100-110	0	0	0	0	0	0	0	0	0
110-120	0.1	0	0	0	0	0	0	0	0
120-130	0.6	0	0	0	0	0	0	0	0
130-140	0	0	0	0	0	0	0	0	0
140-150	0.7	0	0	0.3	0	0	0	0	0

Shell from CA-CCO-458, Sorted By Species

CA-CCO-458 Unidentified Fresh Water Mussel and *Gonidea angulata* from the units

	N120/W105	N120/W106	N120/W107	N120/W108	N122/W104	N122/W105	N122/W106	N122/W107	N122/W108	N122/W110	N124/W105
0-10	0.7	0.6	0.2	0.4	0.8	0.1	0.4	0.6	1.1	0.6	0.4
10-20	1.2	0.8	0.6	0.7	0.8	1.4	0.2	0.7	1.0	0.1	2.2
20-30	1.1	1.0	1.0	1.3	1.3	1.1	0.4	0.7	1.0	0.3	0.9
30-40	0.7	0.7	0.1	0.2	0.3		0.2		1.4	2.0	0.6
40-50									1.0	3.3	3.3
50-60										0.8	1.3
60-70										0.2	0.0
70-80											0.8
80-90											0.0
90-100											0.1
100-110											0.0
110-120											0.4
120-130											0.0
130-140											0.1

	N124\W107	N124/W109	N125/W105	N126/W103	N126/W104	N126/W106	N126/W108	N126/W110
0-10	1.5	1.2	0.2	0.1	0.7	0.1	1.1	0.3
10-20	0.0	0.7	0.2	2.6	0.6	0.8	0.7	2.0
20-30	1.8	4.9	1.2	0.6	1.6	1.2	2.1	1.0
30-40	0.9	0.6	0.1	0.4	0.3	0.4	0.5	3.3
40-50	1.5	0.0		1.0	0.8	15.2	1.5	6.7
50-60				2.3	0.5	0.1	1.0	0.2
60-70							1.5	0.1
70-80							2.7	0.8
80-90							0.1	0.5
90-100								0.5
100-110								0.0
110-120								0.1
120-130								0.6
130-140								0.0
140-150								0.7

CA-CCO-458 *Mytilus* sp. from the units

	N120/W105	N120/W106	N120/W107	N120/W108	N122/W105	N122/W106	N122/W110	N124/W105
0-10	0.0	1.0	0.0	0.0	0.0	0.0	2.1	0
10-20	0.0	0.3	0.1	0.0	0.1	0.1	0.0	0
20-30	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
30-40	0.2	0.0	0.0	0.1		0.0	0.0	0
40-50							0.0	0.1
50-60							0.2	0.1
60-70							0.0	0
70-80								0
80-90								0
90-100								0
100-110								0
110-120								0
120-130								0
130-140								0

	N124\W107	N124/W109	N126/W103	N126/W104	N126/W106	N126/W108	N126/W110
0-10	0.6	0.2	0.4	0.1	0	0	0
10-20	0	0	0.1	0.1	0	0	0
20-30	0	0.2	0	0.2	0.1	0.1	0
30-40	0.1	0	0	0	0	0.6	0
40-50	0.4	0	0	0.1	0.2	0.5	0
50-60			0	0	0	0	0
60-70						0.1	0
70-80						0	0
80-90						0	0
90-100							0.3
100-110							0
110-120							0
120-130							0
130-140							0
140-150							0

CA-CCO-458 *Clinocardium nuttali* from the units

	N120/W105	N120/W108	N122/W108	N124/W107	N124/W109	N125/W105
0-10	0.1	0	0	0.1	0	0
10-20	0	0	0	0	0	0
20-30	0	0	0.3	0.2	0	0
30-40	0	1.8	0	0	0	0.6
40-50			0	0	1.5	

CA-CCO-458 *Macoma nasuta* from the units

	N120/W105	N120/W106	N122/W110	N124/W109	N125/W105	N126/W104	N126/W106	N126/W108	N126/W110
0-10	0	0.3	0.2	0	0	0.2	0	0	0
10-20	0	0	0	0.5	0.8	0	0	0.1	0
20-30	0.3	0	0	0	0	0.3	0.1	0.2	0
30-40	0	0	0	0	0	0	0	0	0
40-50			0	0		0	0	0	0
50-60			0.3			0	0	0	0
60-70			0					0.2	0.3
70-80								0	0
80-90								0	0
90-100									0
100-110									0
110-120									0
120-130									0
130-140									0
140-150									0.3

CA-CCO-458 *Olivella sp.* from the units

	N120/W106	N124/W107	N126/104W	N126/W106	N126/W110
0-10	0	0	0	0	0.1
10-20	0	0	0	0.1	0
20-30	0	0	0.2	0	0
30-40	0.1	0.1	0	0	0
40-50		0	0	0	0
50-60			0	0	0
60-70					0
70-80					0
80-90					0
90-100					0
100-110					0
110-120					0
120-130					0
130-140					0
140-150					0

CA-CCO-458 *Haliotis* sp. from the units

	N124/105W	N126/W103	N126/104W
0-10	0	0	0
10-20	0	0.6	0
20-30	0	0	0.
30-40	0	0	0
40-50	0	0	0.4
50-60	0.8	0	0
60-70	0		
70-80	0		
80-90	0		
90-100	0		
100-110	0		
110-120	0		
120-130	0		
130-140	0		

CA-CCO-458 *Cerithidea californiaca* from the units

	N120/W107	N120/W108	N122/W110
0-10	0	0	0
10-20	0.3	0	0
20-30	0	0.1	0.9
30-40	0	0	0
40-50			0
50-60			0
60-70			0

CA-CCO-458 Unidentified shell from the units

	N120/W105	N120/W108	N122/W108	N124/W107	N126/W103	N126/W106	N126/W108
0-10	0	0	0	0.1	0	0	0
10-20	0.2	0	0	0	0	0	0
20-30	0	0.3	0.1	0	0.1	0.1	0
30-40	0	0	0	0	0	0	0.1
40-50		0	0	0	0	0	
50-60				0	0	0	
60-70						0	
70-80						0	

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